SCAN OPTICS

SERVICE MANUAL

SO-111
SO-151
SO-161
SO-5000
SO-5100
SO-5600
SO-5800

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INTRODUCTION

This manual has been written to allow qualified service personnel to service Scan Optics microscopes. It should be used carefully and with reference to the diagrams included. Scan Optics accept no responsibility for any losses or injuries caused by the actions of those people who undertake servicing using this manual. Our technical staff are always available for assistance, regardless of the age or purchase date of the equipment, so please contact us by phone, fax or e-mail should the need arise. Our contact details are included at the front of this manual.

For the ease of use, this manual is divided into sections covering similar products. The first section covers aspects of routine maintenance that are applicable across the entire range of Scan Optics microscopes. The second section covers the service requirements of the SO-111 SO-151 and SO-161 microscopes due to the similarity of their components and specific service needs. The third section covers the SO-5000 series of Scan Optics microscopes. At the back of this manual, you will find a compilation of drawings and wiring diagrams to assist you in your efforts.

It is important to remember though that no amount of service can compensate for the proper daily maintenance of any piece of equipment, and to that end, we will discuss this issue of maintenance first.

GENERAL MAINTENANCE

MOULD

The growth of mould on the optical surfaces of the microscope is a serious concern, especially in humid environments. If the mould is allowed to grow and remain too long, a permanent scarring of the reflective coating can occur, rendering the lens ineffective. Mould requires moisture, and a food source to grow. By removing these aspects of the environment through regular cleaning, and the correct storage of equipment when not in use, the prevention of growth is achieved. All Scan Optics microscopes come equipped with an internal anti-mould pellet to assist in the prevention of mould growth. This pellet will need to be changed every two to three years, and instructions on how to do so in all models is included in this manual. It is important to cover any equipment when not in use with the microscope covers provided to prevent the accumulation of dust. As an extra measure, it is advisable to store the microscope head and lamphouse assembly in a sealed plastic bag with a moisture absorber when not in use for an extended period. All of these items are available from Scan Optics.

CLEANING

One other factor to consider in the daily maintenance of Scan Optics ophthalmic microscopes is the accumulation of saline and other solutions on the objective lens and prism. As these lenses are located at the lowest point of the microscope, and thereby exposed to this type of contamination on a regular basis it is important to clean them daily when in use. The reason for this vigilance is twofold. Not only will the accumulation blur the image as seen through the eyepieces, but if not removed in a timely manner, this too will lead to an eventual permanent scarring of the lens surface. Scan Optics can supply an optics cleaning pack with an appropriate lens cleaning solution included. If this is not available, an Ether/Alcohol solution can be used. We recommend a mixture of 70% Ether, and 30% Alcohol. However, if Ether is not available pure Alcohol can be used as long as it is of a high percentage. This mixture, along with clean lint free cloth will apply to all lens cleaning you may be required to do as part of the microscope maintenance and service.

EYEPIECES

The final aspect of maintenance that is common across the entire range of Scan Optics microscope is the eyepieces. Cleaning of the eyepiece lenses is a simple procedure, and should be considered in any routine maintenance programme. The process is as follows. First, if in place remove the rubber eye shield from the eyepiece. You can now unscrew the top retaining ring that holds the lenses in place. Inside the eyepiece, you will find two lenses and a spacer separating them. The top lens is a plano-convex lens and must sit in the spacer with the curved surface facing down. The spacer has a small lip on the inside diameter that supports the lens, and as such will need to be placed with this lip at the top. When assembled correctly the top of the plano-convex will sit flush with the top of the spacer. The bottom lens is a compound lens. Upon close examination, you will be able to see the dividing line between the two lenses with the smaller of the two sitting on top. The lens must be replaced in the eyepiece with this smaller lens on the top. After cleaning, replace the compound lens first. If it fails to immediately fall to the bottom of the eyepiece casing, gently tapping the casing on the side of a table or similar solid object may coax it to drop to the bottom. You can tell if it is in the correct resting place by lightly shaking the casing, you should be able to hear the compound lens rattling against the side of the casing. Next is the spacer with the internal lip sitting at the top to support the plano-convex lens. Replace this lens with the curved surface facing downwards into the casing, and the flat surface sitting on top. You can now replace the top retaining ring, and rubber eye shields.

☞ Refer to figure EYE-S1

SO-111/151/161 MICROSCOPES

INTRODUCTION

The SO-111/151/161 series of microscope, although very similar to each other do have some differences, as summarized below.

FEATURE	SO-111	SO-151	SO-161
Microscope head	Zoom	Fixed magnification	Fixed magnification
Arm system	Horizontal + pantograph	Horizontal + horizontal	Horizontal + pantograph
Lamphouse type	Top cable OR Side cable	Top cable OR Side cable.	Top cable OR Side cable
Lamphouse mounting style	Channel mount OR Ring mount	Channel mount	Channel mount OR Ring mount

As an example, the procedure for changing the mould pellet will differ between the SO-111 and SO-161 microscopes, but the procedure for adjustment of the lamphouse will be identical if they both have the same mounting system.

As the table indicates there are two types of lamphouse and two types of mounting styles used on Scan Optics SO-111/151/161 microscopes. Microscopes made before October 1995 feature a lamphouse with the cable entering through a grommet the top of the lamphouse head; microscopes made after this date feature a door in the side of the lamphouse with a detachable cable which connects at the door. The other notable difference is the ability to unwind the lamphouse head, from the lens-barrel in the side cable style, while the top cable style has a head, and lens-barrel that are fixed together.

☞ Refer to figure 161-S1.

Microscopes made before November 1999 feature a channel mounting system for holding the lamphouse in place; microscopes made after this date feature a ring mounting system for holding the lamphouse.

☞ Refer to figures 111-S2 and 111-S3.

Note that where reconditioned microscopes have been supplied, microscopes supplied after the changeover dates may feature the older top cable style lamphouse or channel mounting system.

Other design changes including changes to the arm system, provision of a built-in tilt mechanism, sterilisable knob covers and accessory mounting brackets have also been introduced over recent years. Generally these items should not require servicing, but if any technical information or spares are required, please contact Scan Optics.

MOULD PELLET REPLACEMENT

It is recommended that the mould pellet be changed in the microscope head every two to three years depending on climatic conditions. Replacing the mould pellet in the SO 111 series of microscope will be the same for all 111 microscopes using the Olympus head. To replace the pellet is as follows.

SO-111

First, remove the head from the bonder-arm. This is accomplished by removing the three grubscrews that hold it in place. Next, locate the covering plate that sits on the back of the microscope head opposite the eyepieces. Remove the single screw that sits in the centre of the cover-plate. This may be covered by a small plastic cap. Once the cover-plate is removed, you will be able to see the anti-mould pellet stuck to the right hand side of the internal wall. Simply remove the old pellet with a pair of pliers, being careful not to touch the lenses sitting directly below. After the old pellet has been removed, peel the backing off the new pellet, and fix firmly in place. It is important to replace the pellet in the same location as placing it on the left can cause possible interference with the zoom mechanism, or future beam splitting attachments. Once this is accomplished, replace the cover-plate, and re-secure the microscope in the bonder-arm as before.

☞ Refer to figure 111-S4

SO-151/161

First remove the head from the bonder-arm as described for the SO-111 above. Once removed, unscrew the auxiliary objective lens located at the bottom of the microscope head. You will now be able to invert the head and look inside through the bottom. At this point, you should be able to see the anti-mould pellet fixed to the back wall of the head, between the two lenses. Again, remove with a pair of long nosed pliers being cautious of the lenses. Once removed, replace with the new pellet. Screw the auxiliary objective lens back on, and replace the head in the bonder-arm as before.

☞ Refer to figure 161-S2

LAMP (BULB) SPECIFICATIONS

The lamp life in a microscope will vary from user to user depending on such factors as intensity settings, amount of use, temperature, etc. Therefore, it is impractical to suggest a set term for the replacement of the lamp. As the lamps age, a black deposit will eventually form; reducing the light out put long before the lamp will actually blow. It is recommended that the lamps be replaced as soon as this deposit is noticed, or as soon as a decrease in the light intensity is apparent. One important factor to consider is the type of lamp used. **There is only one lamp that can be used for the SO 111//151/161 microscopes.** It is manufactured by G.E., and it is an M47, G4, 12V-20W pin type halogen. The reason for this exclusivity is the horizontal filament, which is a requirement, as well as the light centre length of 19.5mm. This is the distance from the bottom of the pins to the centre of the filament. Both of these factors must be met in all SO-111/151/161 microscope, and to our knowledge, G.E. is the only company that we are aware of making lamps to this specification. Any other lamp used, and not meeting these specifications will produce a substandard light patch. The correct lamps can be obtained from Scan Optics.

☞ Refer to figure LAMP-S1

LAMP REPLACEMENT - SIDE CABLE STYLE LAMPHOUSE

Simply open the door on the side of the lamphouse pushing where the label indicates. You will now be able to see the lamp, and judge the need for replacement. When removing the old lamp, ensure it has cooled fully as it may be very hot. Once removed, the new lamp can be inserted. **IMPORTANT**: **Do not touch the new lamp with your fingers**! Instead, replace it by exposing only the pins while holding the body of the lamp in the plastic wrapper in which it came. Any grease or other contaminants left on the lamp by your fingers may significantly reduce the life of your lamp, and may cause it to blow immediately. It is also worth noting that should you wish to keep your old lamp as an emergency spare, use a clean cloth to remove it from its holder, again avoiding any contact with skin. To adjust the position of the new lamp, with the lamp on, rotate the bulb adjusting screw located through the back of the lamp house door. This will move the position of the lamp filament in or out of the central axis of the lamphouse barrel. The position which will give the best light output is where the filament of the lamp is slightly off axis, so that the reflection of the filament from the mirror is not shadowed by the filament itself. By experimenting with the adjusting screw, the optimum light output will be achieved.

☞ Refer to figure 111-S5

LAMP REPLACEMENT - TOP CABLE STYLE LAMPHOUSE

First, remove the top cap of the lamphouse. This is held in place by two small screws on either side. It should be set so that you are able to simply pull the top cap off, and snap it back in place as you desire. If however you have trouble in removing this top cap, it may help to loosen the two opposing screws. It is important to note here that only the two small screws opposite each other will require adjustment. Once the top cap is removed, the lamp can be accessed and changed taking care not to touch the lamp surface. Then examine the top cap assembly to check whether the filament of the lamp is in the position to yield the brightest light output. The best position will be where the filament of the lamp is slightly off the central axis of the cap, so that the reflection of the filament may be observed butting against the filament itself. The position of the lamp may be adjusted simply by moving the lamp manually in and out of the lampholder, taking care not to touch the lamp surface. Note also that the lamp should not be skewed, but perpendicular to the lampholder. Once the lamp is changed, and you are ready to place the top cap back on, you will notice a single screw protruding all the way through the top cap. This screw sits between the two smaller screws opposite each other, and it is important that this screw line up with the slot cut into the inner barrel of the lamphouse. This is in fact, the only way the lamphouse will reassemble properly.

☞ Refer to figure 111-S6

LAMPHOUSE LENS CARE

Clean and properly maintained lenses are critical to good function both within the lamphouse, and within the microscope itself. While Scan Optics recommends that no service be undertaken in regards to the microscope head, it is recommended that the lenses inside the lamphouse, be cleaned as part of a routine maintenance programme. We will now cover this aspect of maintenance.

LAMPHOUSE REMOVAL RING MOUNT STYLE

The procedure for removal of the lamphouse depends on the mounting system fitted to that particular microscope. In the latest version of the lamphouse mounting system the lamphouse is held within the bonder-arm by two rings. One made of acetal, and located near the top of the lens-barrel. Tightening of the two grubscrews supporting this ring will prevent it from sliding up or down, as well as preventing it from rotating left or right. The other ring is made of aluminium, and is located at the bottom of the lens-barrel near the prism. Tightening of the two grubscrews supporting this ring will prevent the lamphouse from swinging backwards or forwards. Removal of the lamphouse is made easier by first removing the microscope head. Loosen the two or three grubscrews holding the head in place, and lift out. To remove the lamphouse, loosen the two grubscrews located on either side of the lower retaining ring. You will now be able to swing the lamphouse back and forth. Next, loosen the two grubscrews on either side of the upper retaining ring. You will now be able to slide the lamphouse up and down. If the upper retaining ring is sufficiently loosened, you should be able to pull the entire lamphouse, including the retaining rings, up and out of the bonder-arm.

☞ Refer to figure 111-S3

LAMPHOUSE REMOVAL CHANNEL MOUNT STYLE

If you have the (older) channel style mounting system, you will see your lamphouse held in place by two black plates sitting either side of the lens-barrel. One plate is held in place by a single grub screw, the other by three. To remove the lamphouse from this mounting system simply loosen all grubscrews allowing the two plates to drop out of the bonder-arm. You will now be able to remove the lamphouse. At this point, it is worth winding **in** the three grubscrews on the one side of the bonder-arm so that they are all even, and flush with the outside. The single grubscrew on the opposite side will need to be wound **out** so that no part of it is protruding through to the inside. These measures will ensure easier re-assembly.

☞ Refer to figure 111-S2

LAMPHOUSE DISASSEMBLY LENS CLEANING AND REASSEMBLY SIDE CABLE STYLE

Having removed the lamphouse from the bonder-arm, you are now ready for the disassembly of the lamphouse. **IMPORTANT: Before disassembly, you will need to mark the location where the lens-barrel winds into the head. A horizontal pencil mark on the lens-barrel, at the point where it threads into the head will be required**. This is important because as you wind the lens-barrel in and out of the head, you will affect the focal point of the lenses in relation to the lamp, and all of this has an effect on the light patch. By marking the lens-barrel in this manner, you allow yourself the ability to rewind the lens-barrel to the same height as previously set. It may also be helpful to place a vertical mark on the collar of the lamphouse head directly above the horizontal mark on the lens-barrel. Once you have marked the lamphouse in this manner, you can loosen the two grubscrews located on the collar of the lamphouse head.

☞ Refer to figure 161-S3

This will now allow you to unwind the lens-barrel from the head, and expose the internal lenses. The easiest method of removal for the lenses is as follows; unwind, or remove the circlip or retaining nut (fig.12). Carefully invert the lens-barrel onto a table or similar flat surface ensuring that the lenses remain contained inside the barrel. By carefully lifting the lens-barrel up, you should now have a stack of lenses and spacers in the correct order for re-insertion after cleaning.

☞ Refer to figure 111-S1

At this point, you are now ready to clean all the lenses and reassemble the lamphouse. The procedure for re-assembling the lamphouse is just the reverse of disassembly, and should be straightforward.) Once the lenses have been cleaned, and re-secured into the lens-barrel you can re-wind the barrel back into the head. It is important to ensure that it is wound back to the same position as before. To do so you will need to accomplish the following; you will need to place the mark you previously made back to the same location. You will also need to ensure that the door on the lamphouse head is sitting. Once both of these criteria are met, you can tighten the two grubscrews on the collar of the head thus holding the lens-barrel in place.

LENS CARE SIMPLIFIED VERSION FOR SIDE CABLE STYLE

An alternate approach is to clean just the top lens of the lamphouse. Due to the lamphouse design, the accumulation of dust on the lenses is usually contained to the top bi-convex lens. In this case, only the one lens will require cleaning, and the lamphouse removal, and disassembly is not required. To service the microscope using this approach is as follows. Again, this process is facilitated by the removal of the head as described previously. Once the head has been removed and the lamphouse exposed, you will need to make the same horizontal mark on the lens-barrel as before. This is to ensure that the head is wound back down to the original position. Having done this, loosen the two grubscrews on the collar of the lamphouse head, and unwind the head from the barrel. You will now see any dust accumulation that may be present on the top lens. Simply wipe off this accumulation as described previously, and reassemble the head, again following the directions previously laid out. The cleaning of the lenses in this method has the benefit of not requiring the readjustment of the light patch as it should be in proper alignment to begin with.

☞ Refer to figure 161-S3

LAMPHOUSE REPLACEMENT RING MOUNT STYLE

Now that you have cleaned the lenses and re-assembled the lamphouse, it is time to replace the unit in the bonder-arm. You will notice two dimples on either side of the top mounting ring. These dimples correspond with the top two grubscrews that you loosened to remove the lamphouse in the first place. To replace the lamphouse, lower the unit into the bonder-arm with the prism facing forward. Line up the two dimples on either side of the mounting ring with the top grubscrews, and tighten them evenly so that they are both an equal distance in, and seated into the dimples on the ring. For this process, you may need to support the ring near the top of the lamphouse while tightening the grubscrews to prevent the ring from sliding back down the barrel. You should now be in a position where the lamphouse will rock back and forth, but not up or down. Now replace the head, and re-secure with the three grubscrews. If at this point you find the lamphouse sitting too low or to high, you can adjust this by loosening **one** of the two top grubscrews, and sliding the lamphouse up or down as required.

LAMPHOUSE DISASSEMBLY LENS CLEANING AND REASSEMBLY TOP CABLE STYLE

If you have an (older) style lamphouse where the head and the lens-barrel are a solid unit, and the cable enters the top of the head as opposed to the side, the procedure for disassembly is as follows. Once you have removed the lamphouse from the bonder arm by the means described above, the lenses are accessed through the bottom by removal of the prism holder. **IMPORTANT: Before removing the prism assembly, mark in pencil a vertical line crossing both the prism assembly, and the lens-barrel.** This will allow you at a later stage to replace the prism assembly in the exact same location. You can now remove the two screws located on either side of the lens-barrel, holding the prism assembly in place. Once the prism assembly is removed, you will be able to see a circlip near the bottom of the lens-barrel. This circlip will be holding in place the spacers, and lenses of the lamphouse. Remove this circlip, and again carefully invert the lamphouse onto a table keeping all lenses and spacers inside. Lift the lamphouse up to reveal a stack of lenses and spacers. You can now clean and reassemble ensuring the correct orientation of all lenses and spacers.

When re-assembling the top cable style lamphouse you will probably find it easiest to stack the lenses and spacers on a flat surface in the order they came out of the lamphouse originally. Once

this is done, insertion of all the lenses and spacers is accomplished by carefully sliding the lamphouse back over the stack until it meets the surface of the table. Now, while keeping the lamphouse in this same position, gently slide the lens and spacer stack up until the top bi-convex lens reaches its resting point at the top of the barrel near the head. You can now reinsert the circlip, and replace the prism assembly, being careful to correctly line up the vertical mark previously made. If you encounter difficulty in replacing the circlip, it may be that the lenses have not seated properly, and may require readjustment.

LAMPHOUSE REPLACEMENT CHANNEL MOUNT STYLE

If you have not already done so, wind **in** the three grubscrews on the one side so that they are all even, and flush to the outside of the bonder-arm. Wind **out** the single grubscrew on the opposite side so that no part of it protrudes inside the bonder-arm. While holding the bonder arm in your hand, with the three grubscrews facing upwards, gently place the plate with the three dimples onto the corresponding three grubscrews. You will need to make sure that the dimples on the plate locate correctly onto the three grubscrews. Once in place carefully slide the lamphouse into the bonder-arm, being cautious not to knock the plate out of alignment with the three grubscrews. Now while holding the bonder-arm and the lamphouse both level, you will need to slide the remaining plate along the barrel of the lamphouse until the dimple on the plate lines up with the grubscrew on the bonder-arm. Carefully wind in the single grubscrew until it locates in the dimple of the plate. It is important to ensure that the grubscrew locates properly in the dimple. Once tightened, you will be able to place the bonder-arm and lamphouse upright and back into the pantograph arm. At this point, you can now check to ensure that that all the grubscrews are located properly in the dimples on the plates, and that both plates are sitting square to each other on opposite sides of the lens-barrel.

LIGHT PATCH ADJUSTMENT

Once the lamphouse has been cleaned, and returned to the bonder-arm, and with the head in place, it is now time to adjust the positioning of the light patch to match the field of view for the microscope. For this procedure, you will need a target centre, which has been included in this manual.

Cut out the target and paste it on to a semi-rigid surface such as a piece of cardboard, or rubber. Anything will do, it is only to keep the target flat, and prevent the edges from turning up. To start you will need to make sure that the microscope is completely set up, and power is available to the unit. Tighten all locking knobs, and place the target on the table, or other surface to which the microscope is clamped. Focus on the target, and ensure that when looking through the microscope the target centre is in the very centre of the field of view. You will also need to ensure that horizontal line is running completely horizontal across the field of view and not skewed up or down in any way. **IMPORTANT: At this point, do not move either the microscope, or the target**. It is important that once they are lined up together, they remain lined up together. Now turn on the power, and the lamphouse. The light patch may be a long way off the centre of the target; however, this is fine, as you will adjust it next. **IMPORTANT: Do not move the target to line up with the light patch.** The light patch must be adjusted to line up with the target already in the centre of the microscope's field of view.

The above instructions for lining up the target with the microscope's field of view will apply to all models of microscope, and only the methods of adjusting the light patch to meet the target will differ.

☞ Refer to figure TARGET

LIGHT PATCH ADJUSTMENT RING MOUNT STYLE

Now that you have aligned the target to the field of view for the microscope, it is time to adjust the light patch to align with the target. The procedure for this adjustment in the current style of mounting system is as follows. Loosen **one** of the upper grubscrews only enough to allow you to freely slide up and down, and rotate the lamphouse. As you do this, you will notice the light patch

move on the target below. Position the lamphouse so that the light patch is located centrally on the target, both horizontally and vertically, and that there is a gap of between 1 to 5mm between the prism and the bottom lens. At this point, you will also need to ensure that the prism of the lamphouse is sitting centrally between the internal lenses of the lamphouse. A good indication of this is to look through the eyepieces. If you can see a shadow in the field of view, either to the left or right side, then chances are the prism is not central and requires rotation. To do so, again loosen a single grubscrew from the top retaining ring, and while looking through the eyepieces rotate the lamphouse left or right. As you do this, you will see the shadow switch between the left and right side of the light patch. Position the lamphouse so that it is not visible on either side. Once in position, tighten the single grubscrew previously loosened. You will now be able to swing the lamphouse back and forth, but it should not be able to rotate, or slide up or down. Look through your eyepieces to ensure that the target is still in the centre of the field of view. If it is not, relocate it as before, and adjust the lamphouse as required. Once in an acceptable position horizontally, rock the lamphouse back and forth to find the correct position vertically. Once in place, tighten the two lower grubscrews onto the lower mounting ring. **IMPORTANT: Do not over-tighten the two lower grubscrews as this will cause the bracket to bulge out, and this will affect future, or current assistant microscope applications.** It is important to tighten all four grubscrews evenly to prevent the light patch from being shifted to the left or the right. Once the light patch has been adjusted and secured, you will need to check the target in the field of view. If it is still central, and the light patch is sitting centrally on the target, then the work is complete. If however either is not central, you will need to go through the adjustment process again. At this point, remove the head and lamphouse assembly from the bonder-arm and invert so that you can check to see that the prism is located centrally between the two lenses inside the head.

LIGHT PATCH ADJUSTMENT CHANNEL MOUNT STYLE

The procedure for adjusting the light patch with the channel mounting system is essentially the same. You will need to line up the target with the field of view in the same manner as described above. Once in place, loosen the single grubscrew only enough to allow free movement of the lamphouse, being careful not to loosen it so much that the grubscrew is allowed to slip out of the dimple in the plate. **IMPORTANT: Loosen only the single grubscrew, while leaving the three grubscrews on the opposite side sitting flush with the outside of the bonder-arm as previously set.** Once the lamphouse is able to move freely, adjust the height to set a gap of 1 to 5mm, and position the light patch so that it too is central to the target both horizontally and vertically. Once in position, tighten the single grubscrew to secure the lamphouse in place. Now check to see that the lamphouse is firmly secured, and not able to move in any direction. Here you may need to tighten one or more of the three grubscrews to ensure a firm hold. It is important to watch the light patch for movement as you do this. Some movement may occur, and this is acceptable so long as the light patch remains more or less central. Having secured the lamphouse in the appropriate position, remove the entire head assembly and check underneath to see that the prism is sitting centrally between the two internal lenses.

Although the simplified method of cleaning the lenses is not applicable to the top cable style of lamphouse, it is possible to clean the lenses inside the lens-barrel without removing the lamphouse from the bonder-arm, thereby avoiding the need to readjust the light patch. To use this approach is as follows. Again, you will need to remove the head from the bonder-arm. Now, remove the bonder-arm, **and** lamphouse assembly from the pantograph arm. From this point cleaning and re-assembly is as previously described with the only difference being the attached bonder-arm. After cleaning and replacing the lenses, replace the circlip, and prism assembly. You can now replace the bonder arm into the pantograph arm, and replace the head.

PRISM REPLACEMENT ALL STYLES

Should it ever be required, replacement of the prism in the current style lamphouse is as follows. The prism is contained in the prism housing, and sits below the auxiliary objective lens. Removal is a matter of loosening the three grubscrews located around the bottom of the lens-barrel, and just above the prism holder. **IMPORTANT: Prior to removal of the prism holder, it is advisable to**

mark vertically across the prism holder, and lens-barrel to assist you in replacing the prism holder in the same orientation. Once loosened, you will be able to remove the prism holder, and prism. Invert the prism holder, and remove the three crosshead screws holding the prism retaining plate in place. You can now remove the prism. Replacement of the prism is just the reverse of the above process. **IMPORTANT: The prism has two different angles on each end. One angle is obtuse (blunt), the other acute, and (sharp). It is important that the end with the acute angle be inserted into the prism holder, leaving the obtuse angle as the end that sits outside of the prism holder.** Place the prism, acute angle inwards, in the prism holder, and replace the prism retaining plate. When placing the prism in the holder it is a good idea to leave a gap of one millimetre between the tip of the prism, and the back wall of the prism holder. Once secured, the prism holder can be replaced in the lens barrel, lining up the vertical mark previously made, and tightening the three grubscrews. The above process will only differ slightly with the top cable style lamphouse in that the prism holder is held in place by two screws on either side of the barrel, as opposed to the three grubscrews in the current style.

☞ Refer to figure 111-S1

POWER SUPPLY

For the most part, there are no serviceable components in the power supplies of the SO 111 and 161, and as such it is recommended that the units be returned to Scan Optics should repair work be required. It is difficult to list specific issues regarding the power supply, as nothing internally should require service. However, some factors may affect the function of your unit. We will now cover these issues, as well as some general trouble shooting.

IMPORTANT: It is critical that the power supply be disconnected from the mains power prior to commencing any type of service work. The risk of electrocution from working on a live power supply is great.

The first factor to consider is the voltage setting of the power supply. All Scan Optics microscopes come with a variable voltage selector to allow for operation in countries with either 110V or 240V supply. If your microscope fails to function, it could be that the voltage selector is set to the wrong setting, and as such has probably blown the external fuse. First, check that the correct voltage is selected. The voltage selector is located on the underside of the power supply where the cable enters the unit. Check that it is set to the correct setting for your location. If it is not, the change is made by adjusting with a flat screwdriver to the correct position. Now re-check the function of your microscope. If it is still not functioning, you may need to replace the external fuse. This is located next to the voltage selector, and is removed again with a small flat screwdriver by pushing upwards, and rotating in the direction of the arrow. With the fuse now replaced, again check the function of the unit.

If after making these adjustments, the power supply is still non-functional, the problem may lie with the internal fuse. This is located between the mains switch, and the IEC connector inside the power supply. **IMPORTANT: Disconnect the power supply from the mains power.** Open the power supply by removing the single screw located on the underside of the unit near the fuse, and voltage selector. Once removed, gently lift the lid up, and back. Having removed the front cover of the power supply, you will need to disconnect the earth tag, which you can see attached to the side of the case. You should now be able to see a red wire running between the mains switch, and the IEC connector. In the middle of this wire will be the internal fuse, unscrew the two halves of the black fuse holder and check the condition of the fuse. Replace as required and check the function of the microscope. **IMPORTANT: If this fuse has blown, it may be indicative of greater problems than just a faulty fuse**. It is recommended that after replacing this fuse you carefully monitor the function of the power supply. If you find the fuse blows again in a short period, we recommend you contact Scan Optics concerning this issue.

If the power supply is still not working after checking the above functions, a manual check of all solder connections should be undertaken. If for some reason a solder join has come loose, re-solder and check the function. If after taking all of the above measures you find the power supply still not working, we recommend that Scan Optics be contacted, or the power supply be returned to us for inspection, and repair. As a generality if there is a problem in the power supply, there will be no function whatsoever. One exception to this is the function of the intensity adjustment for the lamphouse. If you find that you have lost the ability to effect an increase or decrease in the light intensity, the problem is most likely a broken solder on the trim pot responsible for this adjustment. Again, open the power supply **ensuring the unit is disconnected from the mains power.** Inside the unit, directly behind the adjustment knob you will see the three wires running form the pot to the PCB. Check for a solid connection, and re-solder if required. If this fails to achieve a result, contact Scan Optics.

☞ Refer to figure 111-W1

SO-5000/5100/5600 MICROSCOPES

INTRODUCTION

The SO-5000 series microscopes differ from the SO-111/151/161 range in that they feature foot controlled zoom and focus. The optical head used is identical to the SO-111 microscope. In addition, the SO-5000 and 5600 microscope feature a floor stand while the SO-5600 also includes teaching aids: a binocular assistant microscope and a video camera and monitor unit.
Before attempting any servicing of the SO-5000/5100/5600 microscope, first become familiar with the appropriate SO-5000 User Manual.

MOULD PELLET REPLACEMENT

The process for replacing the mould pellet in all models of the 5000 series is essentially the same as it is for replacement in the SO-111. It is important to remember that the pellet must be replaced in the same location as before. The only variances in this process will be the removal of the head, and possibly, the back cover depending on the model you have.

The first step in replacement of the mould pellet is the removal of the head. The process for this is the same for all styles of the 5000 series microscope. Removal of the head is as follows. You will first need to remove the cover from the zoom drive. Once removed you will notice a crosshead screw passing through the zoom plate, a spacer and the bonder-arm to secure the head in place. This screw is located in the lower left side of the zoom plate, just below and slightly behind the motor. You will need to loosen, but not completely remove this screw. You will also need to loosen the single grubscrew on the left side of the bonder-arm. Once the head is removed, you can now access the backing plate as described in the section covering mould pellet replacement for the SO-111.

If you have an SO 5600 microscope with the video attachments, you will need to remove the two socket head screws on either side of the TRU unit. **IMPORTANT: When removing this unit you will need to exercise caution as the beam splitter and TRU unit are attached, and you want to avoid <u>any</u> contact with the beam splitter, as the coating is easily marked, and very delicate.** Once removed, change the pellet as described, and replace the TRU being careful not to bump the beam splitter on the inside of the microscope head.

When replacing the head in the bonder-arm, it is important to ensure that the zoom spacer sitting between the zoom plate, and the bonder-arm, and housing the retaining screw that was loosened previously, is replaced as before.

☞ Refer to figure 111-S4
☞ Refer to figure 5600-S1

LAMP REPLACEMENT

The current style of the 5000 series has a quick-change lamp module for your convenience. Replacement of the lamp is simply a matter of removing the lamp module with the old lamp, and replacing it with the module containing the new lamp. Replacement of the lamp itself within the module is made equally simple by a pre-potted lamp. All that is required is to pull out the old lamp and holder, and push in the new unit. **IMPORTANT: When replacing any lamp remember not to touch any surface of the new lamp with you fingers, as this will reduce lamp life.**

LAMPHOUSE REMOVAL AND SERVICING

Due to the power requirements of the 5000 series microscope, all of the accessories have been hardwired into the connector block, which sits directly behind the lamphouse. Removal of the lamphouse requires access into this connector block, and instructions on this procedure are as follows.

EXPOSING THE CONNECTOR BLOCK

The first step to take is to disconnect the zoom cable that runs from the zoom housing to the connector block. You will also need to remove the auxiliary light from the side bracket. Unscrew the retaining knob on the underside of the light, and remove from the bracket. At this point, you can simply hang the auxiliary light off to one side. Next, remove the microscope head using the methods described in *mould pellet replacement.* Once removed, you will now be able to see two small dome nuts sitting on the back of the black mounting bracket, directly behind the lens-barrel at the bottom. Remove, and keep in a safe location. Now, gently wind up the focus knob on the left side, until it reaches the top of its travel. You will now be able to remove the two crosshead screws on either side of the focus rack that pass through the connector block. Having done this you will now be able to separate the front of the bonder-arm, along with the lamphouse, from the connector block. At this point, you will see two lengths of threaded rod protruding from the bottom of the connector block. It is important that they be left as they are, in no way should you attempt to remove or loosen them. You can now look inside the connector block to see where the cable from the lamphouse is connected to the PCB. Once the clamp bar is removed from across the top of the connector block, the cable for the lamphouse can be disconnected from the PCB. Now the entire lamphouse assembly, along with the front of the bonder-arm can be removed from the connector block.

- ☞ Refer to figure 5000-S6
- ☞ Refer to figure 5000-S7-2
- ☞ Refer to figure 5000-S9

LAMPHOUSE DISASSEMBLY

Once removed from the bonder-arm, and connector block, the same principles of lamphouse disassembly for the SO-111 will apply to the lamphouse for the 5000 series of microscope. Again, the first step is to mark the lens-barrel with a horizontal line, at the point where it winds into the lamphouse head, as well as a vertical line on the collar of the lamphouse directly above this. Once marked, loosen the two grubscrews on the collar of the lamphouse head and unwind the head from the lens-barrel. Now that you have successfully removed the lamphouse and separated the head from the lens-barrel, it is time to remove and clean the lenses. The Lens set up in the 5000 series of microscope is slightly different from that of the SO 111 with the inclusion of heat and UV filters, however the removal and cleaning process is essentially the same. As before, this is accomplished by first removing either the circlip or the threaded retaining ring that is holding the lenses in place. Once cleaned, to reassemble is just a matter of replacing the lenses and spacers in the correct sequence, and replacing whatever retention system was used. It is worth noting that in the 5000 series of microscope, the UV filter is located in the prism holder, along with an imaging lens and disassembly is as follows. Prior to removal, it is important to mark a vertical line that crosses both the lens-barrel, and the prism holder. The removal of the prism holder may be removed from the lens-barrel is by unscrewing the three grubscrews holding it onto the lens-barrel. Once it is removed you will be able to see the circlip which holds the lenses and spacers in place. Remove the circlip, and clean the lenses as required.

- ☞ Refer to figure 5000-S1
- ☞ Refer to figure 5000-S2
- ☞ Refer to figure 5000-S3

LAMPHOUSE REPLACEMENT

Having removed, cleaned, and replaced all lenses, it is time to reassemble the lamphouse, and reattach to the connector block and bonder-arm. To begin, wind the lens-barrel back into the lamphouse head until the two lines created earlier line up. As a generality, this will be about seven

turns from the first contact; however this is only a rough guide and by no means represents a firm procedure. **The important factors to consider are the lining up of your vertical and horizontal marks, and the positioning of the prism at 90 degrees to where the lamp enters the side of the head.** Once attached, tighten the two or three grubscrews to hold the lens-barrel in place. You are now ready to secure the lamphouse back into the front section of the bonder-arm. Because all SO-5000 series of microscopes use the ring mounting system as described for the current model of SO-111/161 microscopes, replacement of the lamphouse will follow the same procedures. Once you have the lamphouse mounted back in the front section of the bonder-arm, it is time to reattach the front section of the bonder-arm and lamphouse to the connector block. The first thing you will be required to do is to reconnect the lamphouse to the PCB in the connector block. Once connected, replace the clamp bar at the top of the connector block. You can now gently slide the bonder-arm, lamphouse assembly back onto the connector block, passing the two sections of threaded rod back through the two holes at the bottom of the bracket. Once located, replace and tighten the two crosshead screws previously removed, as well as replacing the two dome nuts on the ends of the threaded rod, and tighten. You can now reattach the auxiliary light, and replace and secure the microscope head. At this point, you are now ready to re-align the lamphouse to the field of view for the microscope.

LIGHT PATCH ADJUSMENT

Although the principles of alignment are the same for the 5000 series of microscope as they are for the 111/161 series, some variation is present. As the light patch for the 5000 series is round, there is no requirement for the use of the target centre to align to the field of view. The procedure for alignment in all models of the 5000 series is as follows. Set the microscope zoom to the minimum amount. (Zoom out as far as possible.) By loosening **one** of the top grubscrews for the mounting ring, you can adjust the lamphouse up or down, as well as rotating it. Adjust the lamphouse so that the prism is sitting roughly central, and there is a gap of between one and five millimetres. Now while looking through the eyepieces, you will be able to see the entire light patch contained in the field of view. This will appear as a circle of light, within the circular field of view for the microscope. While looking through the eyepieces, move the lamphouse around until you can see that the light patch created is sitting in the centre of the microscope's field of view. Once in position, tighten the top grubscrew, as well as the bottom two onto the lower retaining ring. **Note:** You may need to remove the auxiliary light from the mounting bracket in order to access the grubscrew for the lower retaining ring. Having done this, you can check that the prism is sitting centrally by inverting the head and looking up from the bottom. If at this point it is still out of alignment, loosen the grubscrews, and adjust as required. You will also need to check the all grubscrews are tightened, and that the lamphouse is unable to move in any direction.
IMPORTANT: Do not over-tighten the lower grubscrews. Too much pressure will cause the mounting bracket to swell out at the sides, and this may effect the alignment of any binocular assistant microscope you may have as an accessory. It is usually sufficient to tighten the grubscrews one-quarter turn after contact.

LAMPHOUSE HEAD DISASSEMBLY

The design of the lamphouse is such that the disassembly of the lamphouse head should almost never be required. If however it is, the procedure is as follows. On the top of the lamphouse, you can see three crosshead screws counter-sunk into the top cap. Remove, and set aside. You will now be able to disconnect the fan, and remove the cap. The three wall sections will now come away freely. At this point, should it be required, the fan can be removed and replaced. You can now see the back of a concave mirror (or reflector) held inside a reflector cell by a circlip glued in place. The reflector cell and mirror are then secured inside a reflector cell holder, which, is held to the lamphouse by three pillars. Should replacement of this reflector cell be required, the best approach would be to remove the circlip retaining the mirror, followed by the removal of the mirror from the reflector cell. The circlip is held in place by clear glue that will need to be removed, or dissolved with acetone. It is recommended that this approach be taken, as movement of the reflector cell that holds the mirror will alter the focal point of the mirror. Once removed, a new mirror can be put in place, and the circlip glued back in. The reassembly of the lamphouse is simply the above

procedure reversed. If the mirror has been replaced, ensure that it is sitting flat on the bottom of the reflector cell, and that the circlip has been replaced, and re-glued. Place all of the three wall sections back on the lamphouse head, ensuring that the section containing the lamp is sitting at 90 degrees to the prism. Once in place, re-secure the top cap with the three counter sunk screws.

AUXILIARY LIGHT DISASSEMBLY

To change the lamp in the current style of auxiliary is simply a matter of unscrewing the knurled Acetal ring on the front of the light. This ring also houses the UV filter and a heat filter both of which are held into this ring by two grubscrews each. Should it ever be required you can remove both the UV filter and the heat filter from this holder. The process for this is as follows. Having unscrewed the ring from the main body of the auxiliary light you can see the threaded section of the UV filter protruding from the bottom of the ring. Loosen the two grubscrews from along the bottom edge, and the UV filter will simply pull out. Remove and replace as required. Removal of the heat filter follows a similar process. You can see that the heat filter is held in place by an internal retaining ring that is secured by two grubscrews along the top edge. Loosen these two rings, and remove the internal retaining ring. You can now remove and replace as required the heat filter.

ZOOM DRIVE

The zoom drive for the 5000 series of microscope is located in a housing attached to the microscope head. Access to the motor and gears is achieved by removing the two screws holding the cover in place. Once removed, you will be able to see the zoom assembly attached to an aluminium plate and fixed to the side of the head. The zoom function of the microscope is driven in and out by the motor turning a gear attached to an adaptor mounted on the zoom shaft of the microscope. The two microswitches at the top of the zoom plate, limit the zoom at the end of each range. This is to prevent the motor from trying to drive the zoom after it has reached its maximum range. Each microswitch is activated by one of two pins located in the zoom shaft adaptor directly behind the zoom bevel gear. Should it ever be required, adjustment of the zoom limits is achieved through the bending of the lever on the required microswitch. When looking at the zoom plate directly on, the microswitch on the left side limits the zoom in. That is to say, it will prevent the motor from trying to drive once the maximum amount of zoom is reached. If the motor on your zoom drive continues to operate once the maximum range has been reached in either direction, remove the cover, observe the zoom operation at the end of each range, and adjust the microswitch lever accordingly.

The motor for both the zoom and the focus drives are not considered a serviceable component, and as such will need replacement in the unlikely event of problems occurring. The first step required is to remove the solder from the red wire where it joins the zoom socket. You will need to do the same for the black wire where it joins the microswitch, leaving the diode in place. The motor can now be removed and replaced by removal of the four screws sitting on top of the motor bracket. When the new motor is replaced, the wires will need to be soldered back to their original position. The main bevel gear can be removed by removing the lock nut that holds it in place. To accomplish this you will first need to loosen the grubscrew that passes through the nut onto the shaft. If required, a 15 mm spanner can be slid in behind the motor onto the zoom shaft adaptor to prevent the zoom shaft from turning while trying to loosen the retaining nut.

☞ Refer to figure 5000-S5-1
☞ Refer to figure 5000-S5-2
☞ Refer to figure 5000-S5-3

FOCUS DRIVE

The focus drive for the 5000 series of microscope is located in a rectangular casing attached to the bonder arm on the same side as the zoom casing. Access to the components is achieved through the removal of the cover held in place by four screws. As with the zoom drive, the focus drive operates by a modified servomotor driving two gears that are attached to the rack and pinion gearing of the bonder-arm. You will notice the same microswitches located at the top and bottom of the focus housing. These again are the limit switches, and adjustment is achieved through same means as in the zoom drive. If the focus drive is operated with the cover removed, you will be able to see if in fact the motor is continuing to drive after it has reached its limit. If this is the case, simply bend the required lever of the microswitch, and check again the function of the focus drive. Continue with this process until the pin attached to the connector block trips the microswitch stopping the drive before its limit is reached. Should it be required for any reason, removal of the motor from the focus drive is as follows. You will notice a red and blue wire running through the back of the focus casing and into the connector block. The connector inside will need to be removed prior to removal of the motor. It is possible with caution, to make this disconnection without removing the front of the bonder-arm to expose the PCB inside the connector block. If a small pair of long-nosed pliers can be inserted through the opening in the side of the connector block and the connector removed do so. If you are having difficulty in removing it this way, then the front of the bonder-arm will need to be removed from the connector block to expose the PCB inside. Once exposed, disconnect the connector, and pass it back through the connector block, and into the focus housing. Instructions on how to remove the front of the bonder-arm to expose the connectors inside have been laid out in the previous chapter concerning the lamphouse removal. After removing this connector, the next step will be to remove the focus knob on the opposite side of the bonder-arm. To accomplish this, loosen the two grubscrews set into the knob, fixing it into

the shaft. Once loosened you will be able to unwind, and remove the knob. You can now push the shaft in partially thus disengaging the large gear from the smaller gear fixed to the motor. The next step is to loosen the four screws holding the microswitches in place. **Note: it is important that each microswitch be replaced in the same position and orientation.** Once removed, the final step is to remove the motor itself. By pushing on the focus shaft from the end where the knob was previously attached, you will be able to separate the two gears. This will give you access to the small screw and spacer located behind the large gear fixing the motor to the bonder-arm. For ease of replacement, it is suggested that the motor be removed with the mounting bracket attached. This is achieved by removing the two screws sitting behind the focus box, and passing into the bonder-arm. You will now be able to remove the entire focus assembly **except** for the focus shaft, and large gear assembly. It is not recommended that this assembly be removed as the bearing race inside the bonder-arm can pose problems in reassembly, and therefore should only be dismantled to solve specific problems inside the bonder-arm. You will now have the focus drive assembly complete with the microswitches. Should replacement of the motor be required, unsolder the black wire that runs from the motor to the diode, and remove the red wire that runs from the connector to the motor. The replacement of the new motor is this process in reverse.

☞ Refer to figure 5000-S8-1
☞ Refer to figure 5000-S8-2
☞ Refer to figure 5000-S8-3
☞ Refer to figure 5000-S8-4

FOOT CONTROL

If problems are detected in foot control functions, first check the connections at the relevant points in the microscope – zoom, focus and lighting.

Where the problem can be isolated to the foot control itself, this is best confirmed by checking whether the LED on the front panel lights up when the particular foot pedal is depressed. If the LED lights up, the switch is working correctly. If the LED remains lit after the foot pedal pressure is removed, the pedal itself may be mechanically 'stuck'. In some cases (earlier model microscopes) this may be caused by the foot control label de-laminating and physically preventing the pedal from disengaging. In later models the label is longer and tucks underneath the central rest bar. The solution to this problem is to carefully cut away the offending parts of the sticker and to peel them off. Use extreme caution since you will be cutting on a rounded surface.

Where the foot control is not engaging and the LED is not lighting up, two possible causes of the problem are as follows:

- The microswitch under the pedal in question has failed
- The plastic moulding that activates the microswitch has broken off.

To fix these problems, first identify which particular switch is not working. You will notice that the foot control consists of two plastic switch housings each of which contains three switches; a central bar and a mounting plate. Turn the foot control upside down and locate the four holes on the side of the foot-pedal where the faulty microswitch is located. **IMPORTANT: Do not attempt to undo the screws on the mounting plate.**

Using a flat-head screwdriver, insert the blade of the screwdriver in each hole in turn. Then, carefully prise apart the clips that hold the top cover of the foot control in place. Note that the screwdriver position to do this is not always the same in each hole - some are at 90 degrees to the others.

Turn the foot-pedal the right way round again and remove the top cover half in question. Note the three springs should be located on the star-shaped protrusions.

Look at the under-side of the top cover. Check that the three longest wedge-shaped protrusions are intact. These protrusions activate the microswitches that are located on the bottom (fixed) section of the foot-switch.

Locate the microswitch that corresponds to the position of the faulty pedal. Check the operation of the switch by manually depressing the white button, which is surrounded by the red sleeve. If the button does not click correctly, the microswitch is faulty. The foot control may be connected to the microscope unit to check the operation of the pedal.

- If the protrusion that activates the microswitch is broken, but the microswitch still operates, you could try to shape a replacement piece (from wood or plastic) and glue it in to place.
- If the microswitch is faulty, replacements may be ordered from Scan Optics. Cut the wires on the existing switch, remove it and put the new switch in place, soldering to each wire in turn. Use heat shrink or insulating tape so the wires do not come in contact with one another.
- If neither the protrusion nor switch is faulty, it is possible the protrusion is misaligned and the foot-pedal may be successfully repaired by carefully pairing the cover and bottom half together.

To return the foot control to its original condition, replace the cover on the foot control checking that the three springs are in place. Ensure that the cover lines up correctly with the bottom half of the unit. Apply firm pressure to 'click' the four lugs back in place.

☞ Refer to figure 5000-S8-10

VIDEO ATTACHMENTS

The video system for the SO 5600 can be broken down into three basic components, or groups of components. The first is the monitor. Scan Optics uses an LCD monitor on all video systems, and considers no part of this monitor as serviceable. Should any fault occur with the monitor, the only course of action we recommend is to return the unit to Scan Optics, and we will contact the manufacturer for repair. The second component is the C-mount camera, and CTV assembly. Again, this is not considered a serviceable component, and it is recommended that the unit be returned to Scan Optics should any repair be required. On the top of the camera, you will notice three adjustment points. All of these can be adjusted to the preferences of the end user, and more information can be attained from the camera manual supplied with all video systems. The camera comes attached to an SZ-CTV unit. This unit will allow for focus of the camera image independently of the microscope focus. During manufacture, the camera is focused to the same plane as the microscope. Should it ever be required, it can be re set as follows. First, zoom in on an object to the full extent of the zoom range. Focus the microscope so that the image is clear, then using the focus adjustment on the back of the CTV unit, focus the image on the monitor. The camera is attached to this CTV unit through a C-mount adaptor ring that is threaded into the bottom ring of the camera. This adaptor ring will have a heavily knurled finish, and be either black or silver in colour. This ring should not be confused with the black ring held in place by three grubscrews to the bottom of the camera. The other side of the ring will be threaded into another silver ring, with a grooved circumference. This grooved ring in held into the CTV by the silver screw sitting out to one side of the CTV unit. For the correct orientation of the image on the monitor, it is important that the camera sits in the CTV with the CE mark forward (towards the eyepieces of the microscope head.) The final component is the TRU unit. This unit houses the beam splitter and mirror assemblies. It is attached to the back of the microscope by two socket head screws sitting either side.

IMAGE ADJUSTMENT

If it is ever required, the image shown on the screen can be rotated clockwise or anticlockwise by loosening the single screw which protrudes from the side then rotating the camera assembly in the direction required.

It is within the TRU unit that the only recommended lateral image adjustments be made, in order is to centre the image on the monitor with the centred image of the microscope head. If lateral adjustments are required, first decide which way the image needs to move. The image can only be adjusted diagonally, not horizontally or vertically, sometimes the image will need to move in both directions, if so it does not matter which is adjusted first.

If the image needs to move along diagonal from bottom right of screen to top left of screen, the mirror needs adjusting. If the image needs to move along diagonal from bottom left of screen to top right of screen, the eccentric stop needs adjusting.

DISASSEMBLING THE HEAD FOR BEAM-SPLITTER ADJUSTMENTS

Remove the camera assembly from the microscope head. Undo the two screws on the zoom cover and remove. Remove the guide handle by undoing socket head screw. Unwind the screw holding the zoom plate to the bonder arm and grubscrew on the left side of the bonder arm.
Pull out the microscope head. Undo the two socket head screws on the back of the trinocular unit and remove from the head. **IMPORTANT: Avoid all contact with the surface of the beam splitter. The reflective coating on the beam splitter is extremely delicate, and cannot be easily cleaned.**

☞ Refer to figure 5600-S1

If adjusting the mirror, skip to the mirror adjusting instructions, otherwise undo the two socket head screws on bottom of trinocular unit and remove the section holding the mirror and beam splitter.

ADJUSTING THE ECCENTRIC STOP

Apply a small amount of acetone to the grubscrew at the rear of the beam splitter/mirror assembly to remove adhesive, then loosen off the grubscrew,
Undo the two small Philips head screws at the base of the beam splitter/mirror assembly on the TRU lock washer, so that the beam splitter pivot moves freely. The eccentric stop is the slotted part that the small grubscrew is immediately below. Turn the stop a small amount, approximately $1/8^{th}$ of a turn, as only a small adjustment can have a big effect on image location on the monitor.

☞ Refer to figure 5600-S2
☞ Refer to figure 5600-S3

Sometimes, because the stop has been turned further than normal, the reverse to what the diagram says will apply, however 90% of the time the diagram will be right.
Make sure the pivot is touching the stop.
Tighten the grubscrew and screw the Philips head screws back in the TRU lock washer. Place the beam splitter/mirror assembly back in the trinocular unit housing and replace the socket head screws. Place the trinocular unit back in head and wind the socket head screws back in. Place the microscope head back in the bonder arm, tighten the Philips head screw and grub screw. Replace the camera assembly and check the image location on screen.
Repeat process until the image is in the desired location.

ADJUSTING THE REAR MIRROR

Apply a small amount of acetone to the four locking and adjusting grubscrews to remove adhesive. Loosen the locking grubscrews, turn both adjusting screws approximately $1/8^{th}$ of a turn, as only a small amount of adjustment is required to move the image.

☞ Refer to figure 5600-S2
☞ Refer to figure 5600-S3

Tighten the locking grubscrews back up, place the trinocular unit back in the microscope head, replace the socket head screws and place the head back in the bonder arm, tighten the Philips head screw and grub screw. Replace the camera assembly and check the image. Repeat the process until the image is in the desired location.
When the monitor view is centred with the eyepiece view, remove the in/out lever and lock the beam splitter into place with the TRU lock washer. Ensure that rear mirror is locked firmly into place. Stick foam over TRU lock washer to fill the gap. Carefully place TRU onto rear of head and secure. Re-check that the monitor view is still centred.

POWER SUPPLY

An AMTEX NFS110-7915 is a medically rated switched mode power supply (SMPS) that supplies a regulated DC 15V supply to the Controller PCB. It has a rated capacity of 80W for convection cooling to 110W forced air-cooled. Mains input voltage range from 85Vac to 264Vac and 120Vdc to 370Vdc with line frequency ranging from 47Hz to 440Hz.

A high voltage mains switch is used to power-up the SMPS. Turning this switch off will cut all power to the unit. Turning the switch on will activate the SMPS.

The heart of the SDS-213 Controller PCB is controlled by a programmable 8-bit ST62T65CB6 microprocessor that controls all functions of the power supply output. On board, it regulates its own 6V from the SMPS.

An on/off switch can be found on the main upper control panel. Turning the switch on will activate the Controller PCB and allows the options to turn the Main and/or Auxiliary lamp on/off and adjust the brightness of these lamps. The Controller PCB also 'listens' for signals from the foot control, which controls the focus and zoom motors and the lamp brightness

The two lamps are rated 50W and 20W for the main and auxiliary lamp respectively. Together they draw a nominal total of 5.9A (no peak current data available). The lamps are modulated at a frequency of about 100Hz with varying duty cycles to control the brightness. When these lamps are turned off, the microprocessor diverts the current to a dummy load (2 x 2R2 5W resistors). This is required since the SMPS needs a minimum load to supply a steady regulation and to achieve the design MTBF specifications. There are five levels of lamp brightness which can be adjusted by pressing the lamp brightness button on the front control panel. Five LEDS will light up accordingly to indicate the level. The right most LED indicates minimum intensity and left most LED indicates maximum lamp intensity. At maximum, the lamp outputs approximately 80,000 lux at the correct working distance.

During power up, the main lamp does not turn on to maximum immediately, but rather is ramped up slowly. This improves the lamp life and also limits the surge current. The lamp brightness is controlled by modulating the input DC voltage's duty cycle (PWM). The microcontroller is programmed to vary the duty between 10% and 100%. The main 50W lamp requires ~3.3A to operate at maximum 15VDC.

The motors that drive focus and zoom are NES-507 dc servomotors. The directions of these motors are controlled by the logic in the foot control micro-switches and the limit switches and diode combination in the focus and zoom control box. A variable voltage regulator controls the applied voltage to the motors; effectively it controls the speed of the motors. A potentiometer on the front panel of the unit allows adjustment to be made.

Three 12Vdc fans are used for cooling. One is used in the main power supply enclosure. The other two are used to cool the lamp-house and auxiliary light. Since the SMPS only provides 15V output, a 12V regulator located in the connector block regulates the light fans.

The microprocessor also controls the buzzer, which will make an audible beep when any of the buttons are pushed on the main upper panel. A beep is also heard when the lamp brightness is adjusted from the footswitch. No beep is created when the zooming or focusing.

In the event that Mains power is unavailable, the unit has the ability to be powered from an external source (e.g. a 12V-car battery). When no 15V is supplied to the Controller PCB, a relay will switch the circuitry to draw power from the external source.

To protect the unit from incorrect usage or faults, protection diodes are used to protect the Controller PCB from incorrect polarity and current surge. There are two reset-able, thermal strip

circuit breakers to provided overload protection. The first is a 3A connected directly in-line with the Mains neutral line. This is an additional safety feature to the slow-blow 5A Active line fuse on SMPS. The second is a 7A circuit breaker in series with the 15V output from the SMPS. This is to provide protection to the Controller PCB in the event that the SMPS fails and provides an output above the specified range.

A feature of the power supply is that it will only be on when there is a minimum load of at least 22Ω. In the event that the SDS-213 board fails, the SMPS will not power up.

FOCUS/ZOOM CONTROL

The focus and zoom motors are controlled by a simple H bridge circuit of micro-switches inside the foot switch unit. The positive and negative voltage rails to the motors are swapped accordingly each time the pedals are depressed. The speed of the motor is controlled a simple variable voltage regulator (LM317T) which varies the voltage between 2 and 6V.

Inside the focus and zoom housing block (on the microscope head) there are micro-switches which are broken when the microscope head reaches the limit of movement. When these switches break, it cuts the forward power rail to the motor, but still allows the motor be reversed through diodes.

VARIANTS

SO-5000/5100/5600 models manufactured prior to May 2001 may feature 1A or 2A circuit breakers in place of the 3A mains circuit breaker or a 10A circuit breaker in place of the 7A circuit breaker which is in series with the 15V output from the SMPS.

SO-5000/5100/5600/5800 models that have the SDS-213 controller board with version G onwards will have a slightly different internal pillar loom (the cable which runs up/down the main pillar). The cable now terminates on the PCB at X1 and X10. X1 is a 3 way 0.156” heavy gauge connector for the higher lamp current. X10 is a 5 way 0.1” connector for the lower current focus, zoom and camera power system. These changes do not affect the electrical characteristics in any way.

SUMMARY

If the unit suddenly fails to work, before removing, check the status of the two circuit breakers located on the face of the power supply. If the circuit breaker has been tripped, you will be able to see the white indicator on the top of the switch. If this is showing, ensure the power supply is switched off, then press in and hold for a few seconds to reset the switch. If the switch fails to reset, or it does not solve the problem, contact Scan Optics for assistance. If required, removal of the power supply is as follows. Once disconnected from the power source, remove the four screws from the underside of the power supply that hold it to the clamp casting. Once removed, you should be able to lift up, and towards you to remove the power supply. At this point, you will notice the unit is still connected to a wiring loom that runs up the inside of the pillar, and by the leads that run to the fan on the left side of the power supply enclosure. Disconnect both of these connections at the PCB and remove the power supply. Once removed, you will now be able to view the inside of the power supply. Due to the complex nature of the power supply, it is difficult to list specific faults that may occur, or appropriate remedies. Reference to the wiring schematic supplied may be of assistance to you. If the nature of the problem is not immediately clear, contact Scan Optics for assistance, or return the unit with a description of the problem. **IMPORTANT: As with any power supply it is critical that the unit is disconnected from mains or battery power prior to any work being attempted.**

- ☞ Refer to figure 5000-W1
- ☞ Refer to figure 5000-W2
- ☞ Refer to figure 5000-W3
- ☞ Refer to figure 5000-W4
- ☞ Refer to figure 5000-W5

SO-5800 MICROSCOPE

INTRODUCTION

The SO-5800 microscope system is based on the SO-5000/5100/5600 series microscope system, with the following differences:

- The SO-5800 microscope features XY positioning controlled by a joystick on the foot control
- The SO-5800 features a larger dedicated floor stand and cannot be table mounted.
- The SO-5800 does not have battery backup or an auxiliary light source.
- The SO-5800 (like the SO-5600) includes a video system and assistant microscope as standard, but the monitor screen is larger than the standard SO-5600 monitor.

In other respects the So-5800 features identical microscope optics, and the same power supply controller and power supply as the SO-5000/5100/5600 microscopes.

For mould pellet replacement, foot control, focus, zoom and image adjustment troubleshooting, please refer to the relevant parts of the SO-5000/5100/5600 section

Before attempting any servicing of the SO-5800 microscope, first become familiar with the appropriate SO-5800 Assembly Manual and So-5800 User Manual.

XY UNIT TROUBLESHOOTING

If the LED on the front panel of the X-Y unit is flashing continuously, it means that the X-Y unit is in 'return to centre' mode, and will not respond to any other movement commands from the joystick. In this case, it may be that the return to centre sensitivity is set such that the function is being activated continuously. In this case, simply rotate the knob marked 'RTC sensitivity' on the back of the X-U unit (later models) or by inserting a Philips head screwdriver through the hole marked 'RTC sensitivity' on the top cover of the X-Y unit. The ideal setting is one where the user is able to activate the return to centre function by placing a hand near the sensor window, but will not accidentally activate. Another possible cause of continuous flashing of the LED is that the X-Y motor speed has been set so low that there is insufficient voltage for the motors to drive the microscope to the centre position. If this is the case, set the knob located on the main power supply panel to maximum speed, and switch the microscope off for at least 5 seconds to re-set it. Then switch the microscope back on again.

REMOVING THE TOP COVER

If the sensitivity adjustment is difficult to access, or in the event of another problem with the XY unit, first separate the assembly from the rest of the microscope. Disconnect the head assembly from the X-Y unit by detaching the 'head power' and 'camera power' cables from the back of the X-Y unit. Then unscrew the suspension bracket/head assembly from underneath the X-Y unit. Place the head assembly carefully to one side. Disconnect the microscope power cable from the X-Y unit then remove it from the end of the pantograph arm by unscrewing the main knob and undoing the three safety screws. Place the X-Y unit on a bench, and if possible position the microscope stand so that the microscope power cable may be reconnected to the X-Y unit. This will allow testing under power and eliminate the need to replace the unit in the end of the arm to check the unit.

Remove the top cover of the X-Y unit by undoing the top line of two screws on the front and back panels. It is crucial that these are the only screws that are removed. Then lift off the top cover and cover plate to reveal the workings of the X-Y unit.

To adjust the RTC sensitivity on earlier models where there is no dedicated knob on the back panel of the X-Y unit, locate the trim pot on the PCB that lines up with the hole in the top cover. The trim pot is off-white with a yellow central section where the screwdriver engages. This should be

pointing upward towards the top cover, but it is possible the trim pot has been angled back from attempts to find it with the screwdriver. If this is the case, gently push it back into position.

Where other problems have been identified, the entire back panel may have to be removed for easier access. Remove the two screws along the bottom line of the panel. Check the row of connectors located on the PCB. The connectors should be pushed in place firmly if they are not seated correctly. Check also for any wiring 'snags' which may be impeding the movement of the internal mechanism or for foreign matter on the North/South and East/West drive shafts. Note that these shafts essentially stay fixed while the motor and gear mechanisms drive along them. When the connectors are in place correctly, replace the back panel.

To replace the top cover and cover plate on the microscope and practice locating the adjustment screw through the hole. Then reassemble the X-Y unit and head back on the end of the arm remembering to re-tighten the three safety screws.

☞ Refer to figure 5800-S1
☞ Refer to figure 5800-W7

XY CONTROLLER BOARD

The control system is located within the X-Y positioning unit. Similar to the SDS-213 Controller board, the heart of the XY controller board is also a micro-controller. Its main purpose is to drive the two motors in the XY box according to the direction received from the joystick. It also controls the return to centre function and controls the speed of the movement. (For full technical details, please refer to the XY Controller Board technical manual)

Joystick

When the joystick is pushed in the desired direction, it sends a digital high to the microcontroller which in turn tells the motor driver IC to drive the DC motor in the right direction. When the signal is received, by the microcontroller, a LED will light up continuously on the front panel of the XY box and also the main front control panel of the microscope power supply column.

Return to centre (RTC)

The return to centre function works by detecting a dark area in front of the sensor mounted on the front side of the XY box. The detector is a simply light dependant resistor which has a dark resistance of 20MΩ. Using a voltage divider circuit and coupled to a voltage comparator, a digital signal can be sent to the microcontroller when the operator covers the sensor up with a finger/hand. This activates the microcontroller and begins the sequence to return the microscope head to the centre position. During this phase, the LEDs will flash on and off until it has reached the centre.

Motors

The XY movement is controlled by two 12VDC motors mounted inside the XY frame. The motors drive a helical gear by a worm fixed to the shaft. A female thread inside the helical gear is matched to a threaded rod fixed to the system frame. One motor controls the back and forth whilst the other controls the left and right direction. By varying the voltage to the motor, the speed can be adjusted. The voltage is regulated by a variable voltage regulator on the XY controller board and is adjusted by the speed controller on the main front control panel.

☞ Refer to figure 5800-W7

POWER SUPPLY

In all functional respects the SO-5800 power supply is identical to that of the SO-5000/5100/5600 with the exception that the power supply also supplies the separate X-Y control system. A separate power supply to power the monitor screen is located behind the lower pillar panel. This power supply uses the same mains input as the microscope but in all other respects is separate.

Note that there may be some minor variations in wiring colour schemes from those presented in the schematic diagrams. In the case of wire colour variation, check the terminations (eg pin number/letter) at the connected ends of the wire to check if it performs the same function as specified. If in doubt, contact Scan Optics for technical advice.

- ☞ Refer to figure 5800-W1
- ☞ Refer to figure 5800-W2
- ☞ Refer to figure 5800-W3
- ☞ Refer to figure 5800-W4
- ☞ Refer to figure 5800-W5
- ☞ Refer to figure 5800-W6
- ☞ Refer to figure 5800-W7
- ☞ Refer to figure 5800-W8

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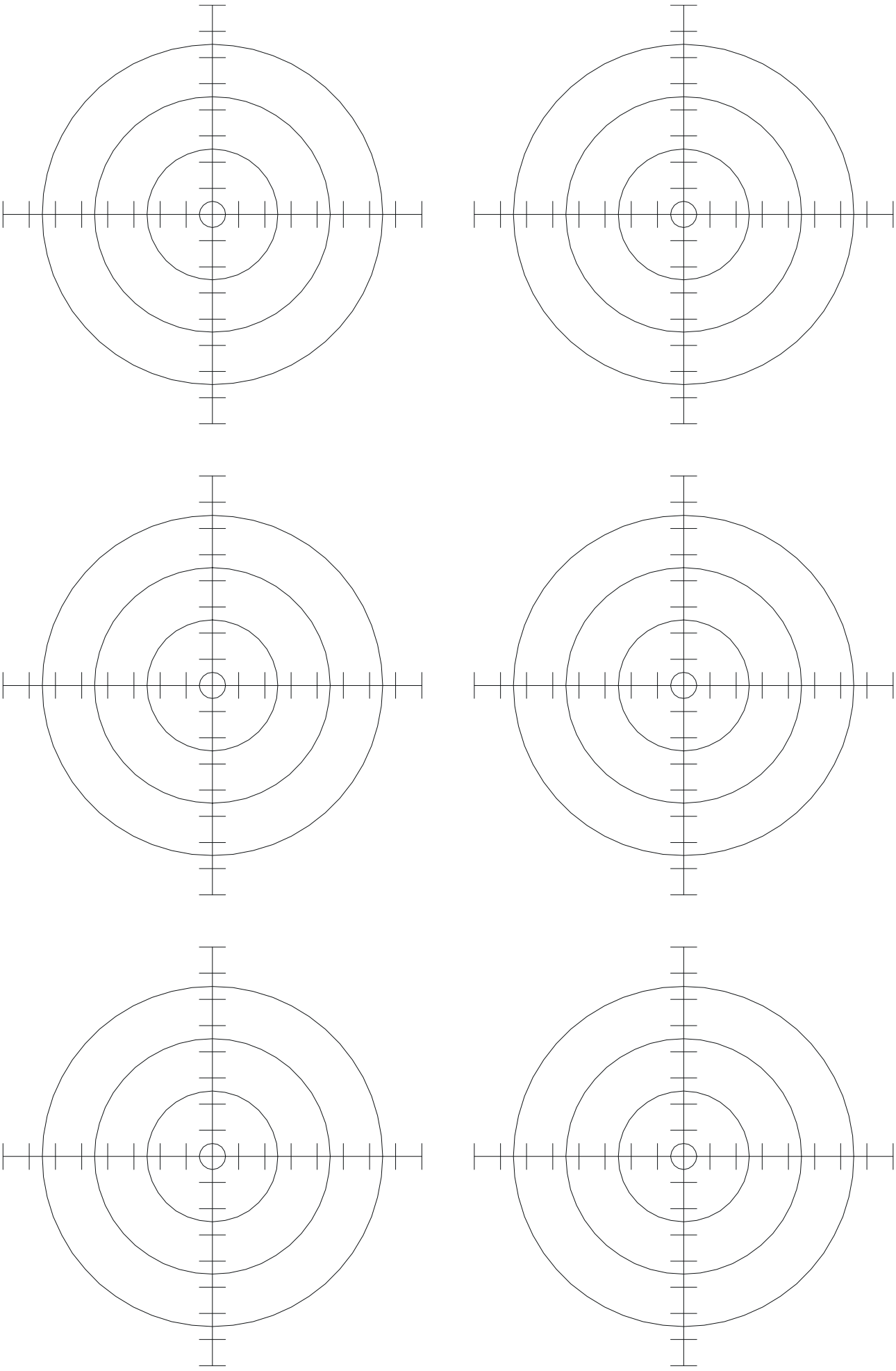
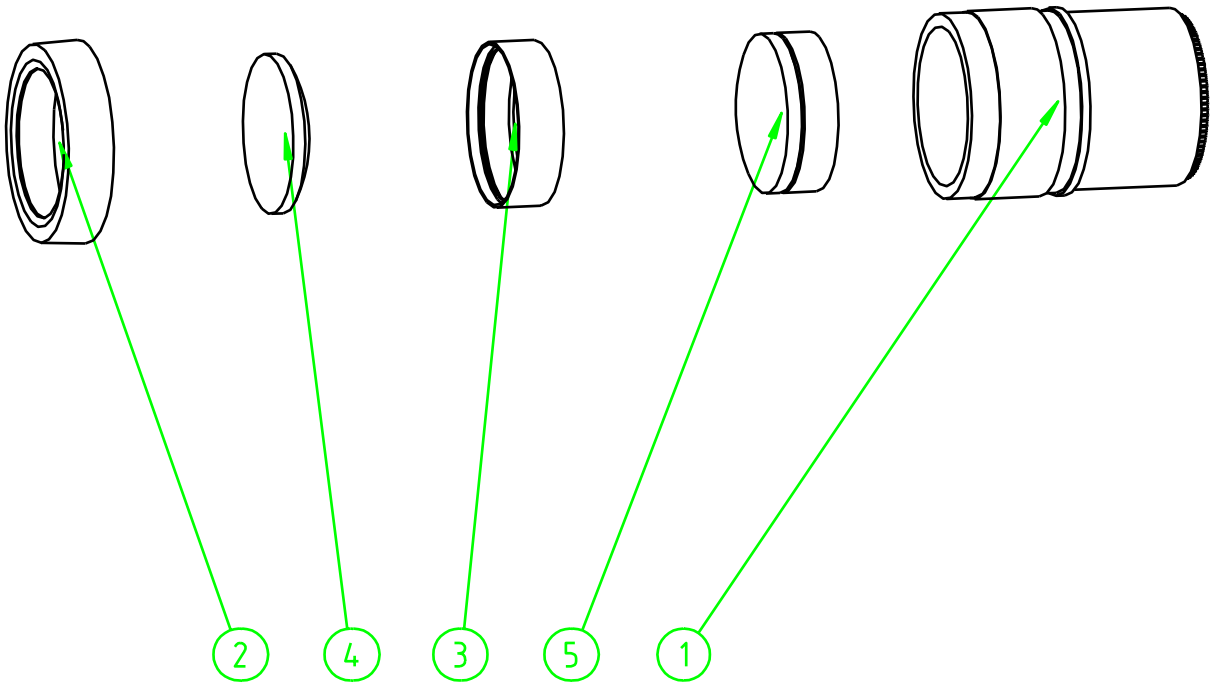


COMMON 10x EYEPIECE ASSEMBLY

SERVICE MANUAL
SCANOPTICS
EYE
S1
Drawn by: RJK
Date:30/5/2

Item	Name	Qty
1	EYEPIECE CASING	1
2	FRONT CAP	1
3	SPACER	1
4	PLANO-CONVEX LENS	1
5	COMPOUND LENS	1

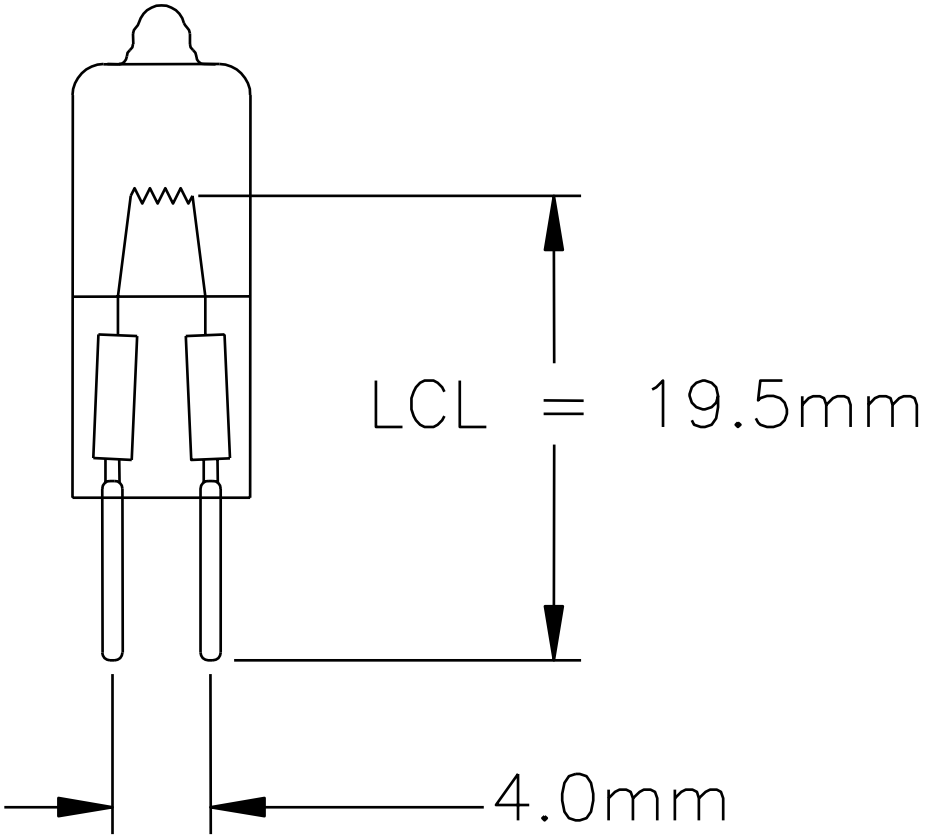


LAMP SPECIFICATION

SERVICE MANUAL

SCAN OPTICS

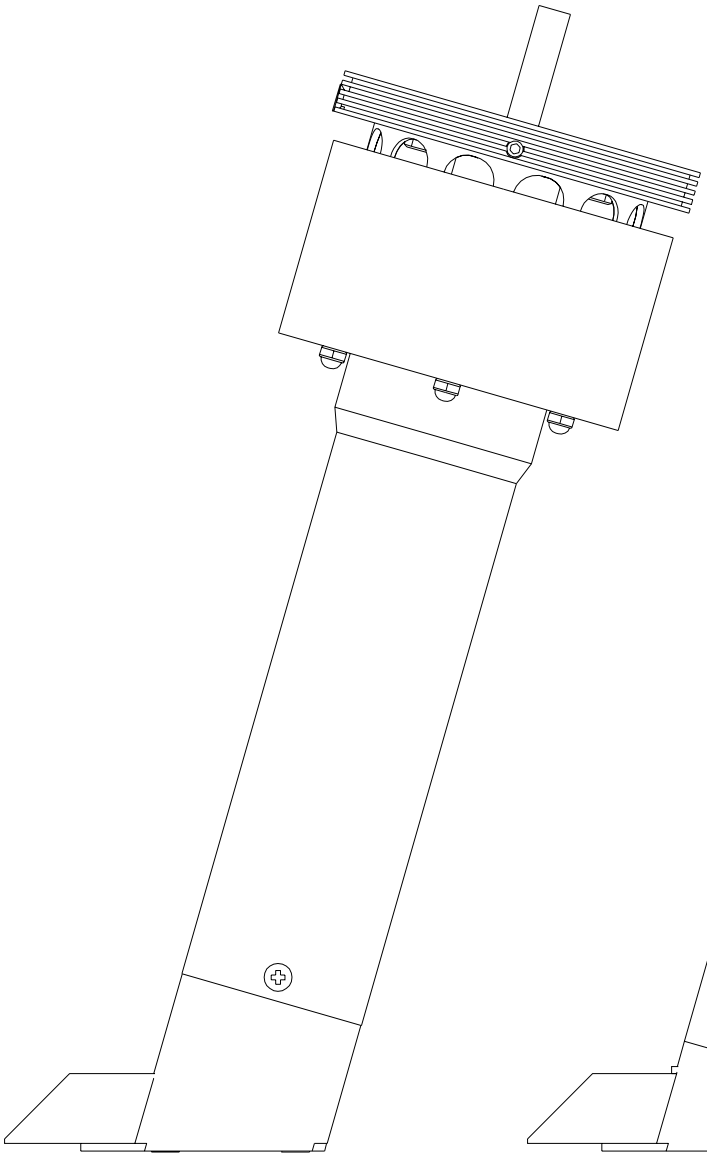
LAMP
S1
Drawn by: RJK
Date:30/5/2



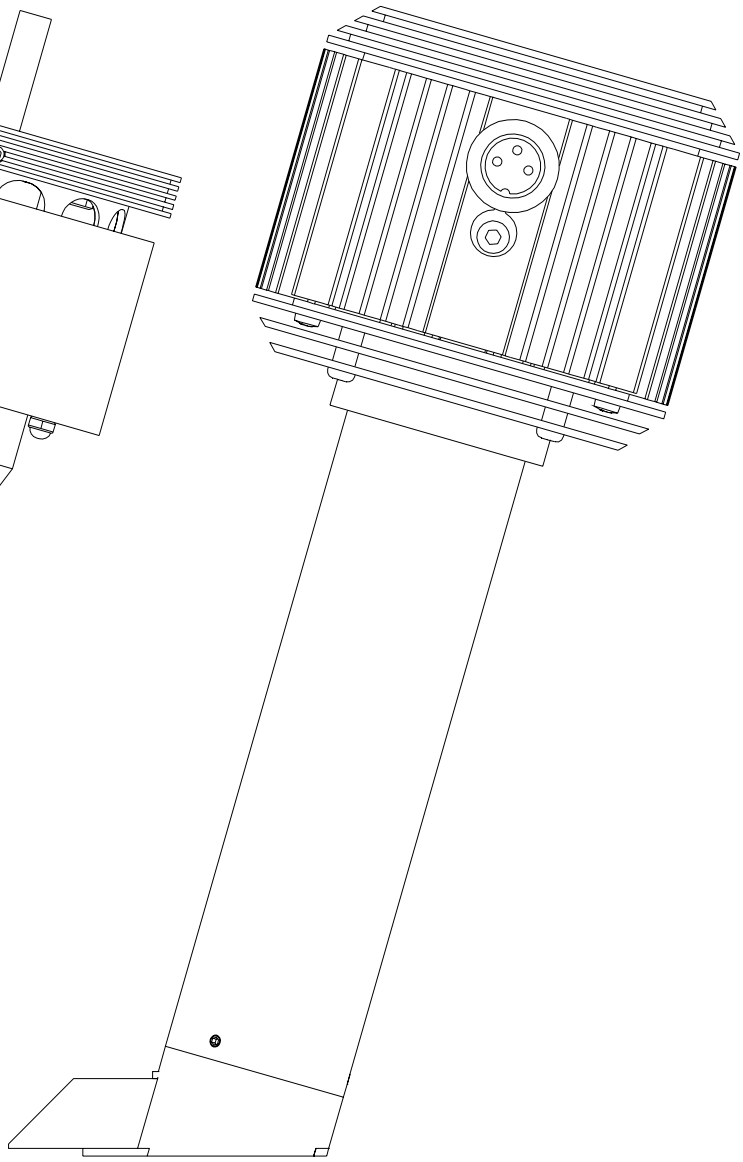
LAMPHOUSE COMPARISON

SERVICE MANUAL 161 S1
SCAN OPTICS
Drawn by: RJK
Date:23/7/2

TOP CABLE ENTRY STYLE



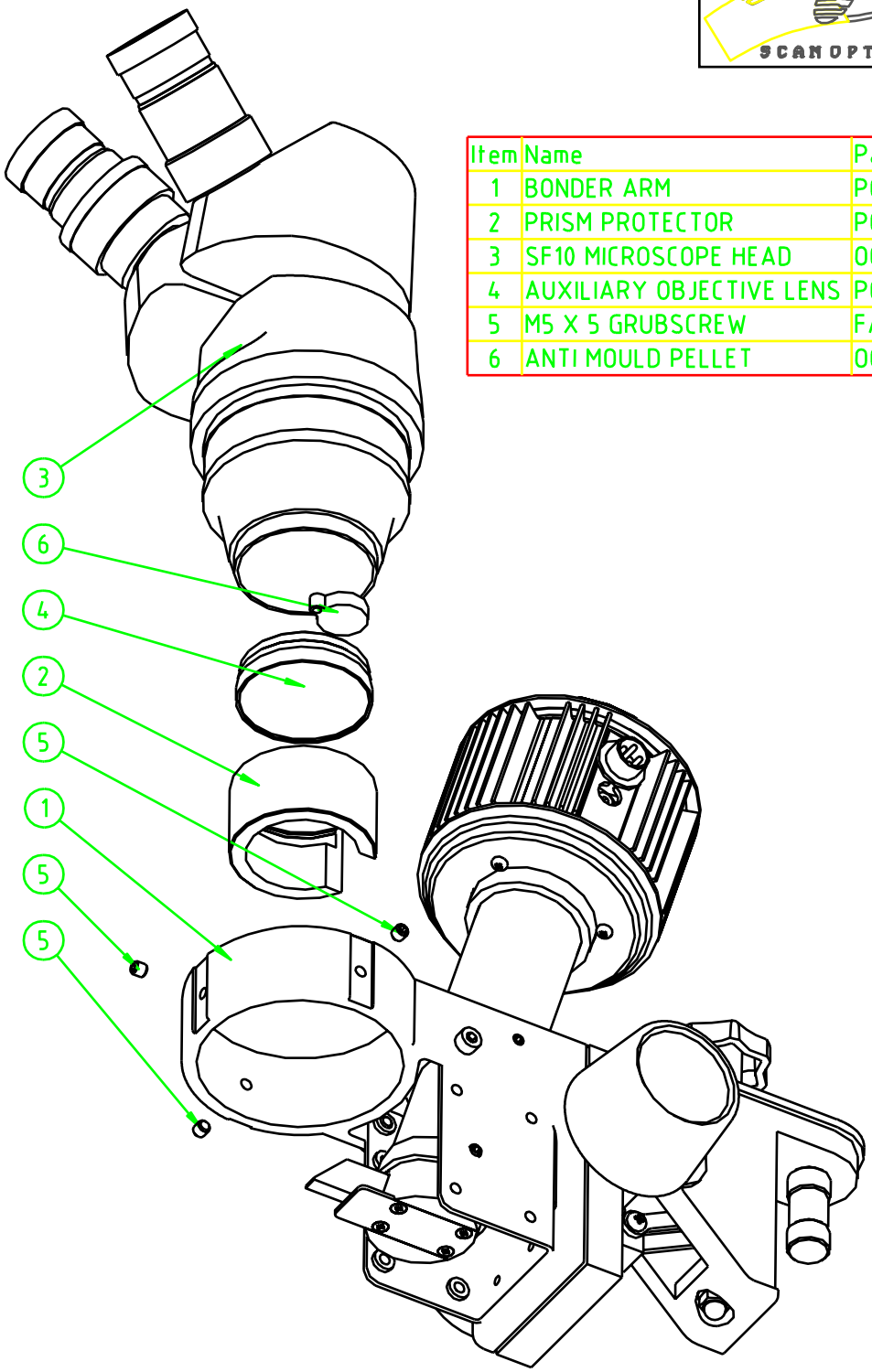
SIDE DOOR CABLE ENTRY STYLE



SO-161 MOULD PELLET REPLACEMENT

SERVICE MANUAL
161 S2
SCAN OPTICS
Drawn by: RJK
Date:01/08/02

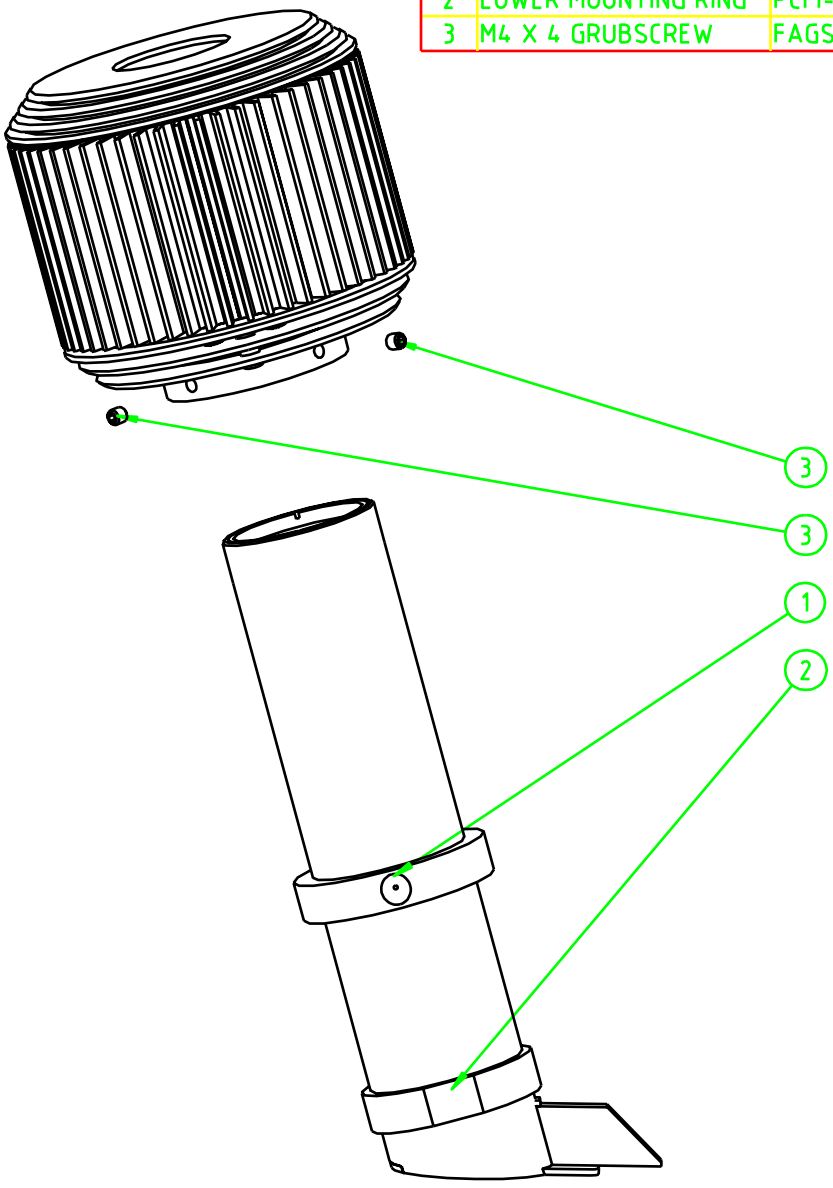
Item	Name	Part Number	Qty
1	BONDER ARM	PCFI-00049	1
2	PRISM PROTECTOR	PCFI-00078	1
3	SF10 MICROSCOPE HEAD	OCOL-00005	1
4	AUXILIARY OBJECTIVE LENS	PCFI-00079	1
5	M5 X 5 GRUBSCREW	FAGS-05005	3
6	ANTI MOULD PELLET	OCOL-00004	1



LAMPHOUSE BARREL REMOVAL

SERVICE MANUAL 161 S3
SCAN OPTICS
Drawn by: RJK
Date:01/08/02

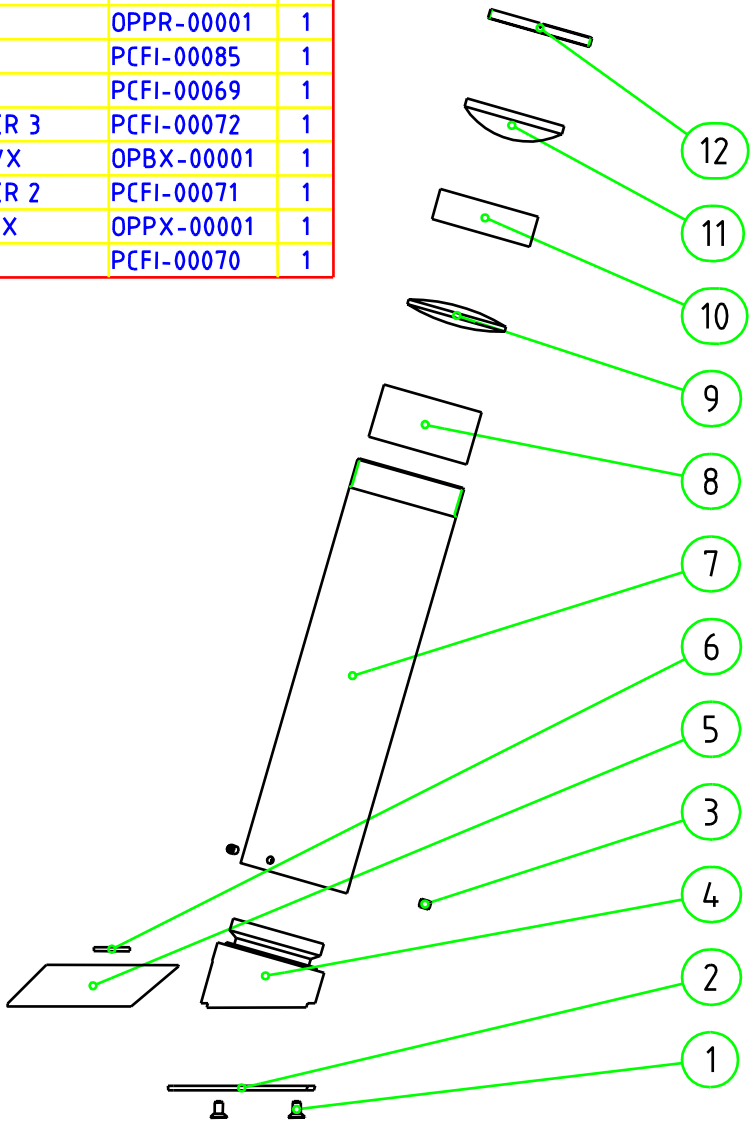
Item	Name	Part Number	Qty
1	UPPER MOUNTING RING	PCFI-00075	1
2	LOWER MOUNTING RING	PCFI-00076	1
3	M4 X 4 GRUBSCREW	FAGS-04004	2



SO-111 LAMPHOUSE BARREL OPTICS

SERVICE MANUAL
SCAN OPTICS
111-S1
Drawn by: RJK
Date: 29/5/02

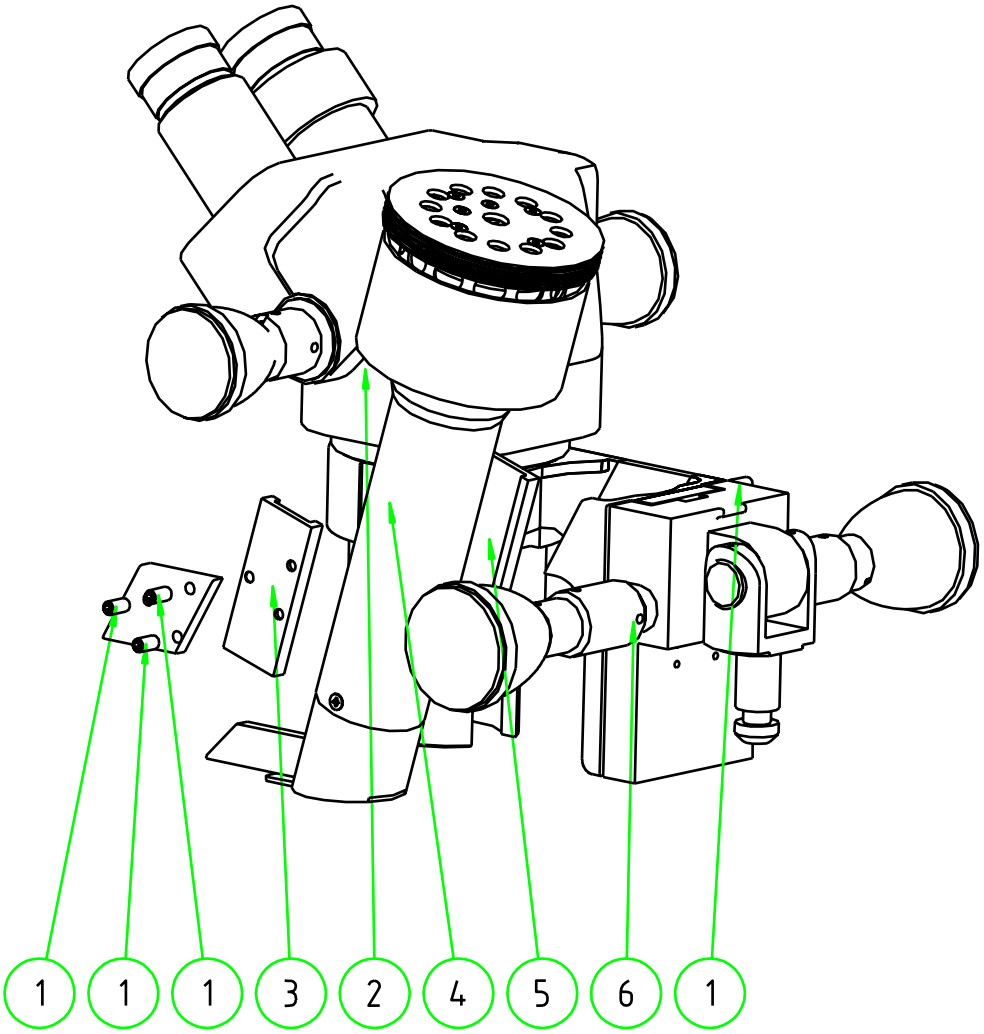
ITEM	NAME	PART NO.	QTY
1	M3 X 6 CSK SCREW	FACS-03006	4
2	PRISM COVER PLATE	PCFI-00074	1
3	M3 X 4 GRUBSCREW	FAGS-03004	3
4	PRISM HOLDER	PCFI-00073	1
5	PRISM	OPPR-00001	1
6	FOAM SPACER	PCFI-00085	1
7	LENS BARREL	PCFI-00069	1
8	LENS BARREL SPACER 3	PCFI-00072	1
9	CONDENSER LENS BVX	OPBX-00001	1
10	LENS BARREL SPACER 2	PCFI-00071	1
11	CONDENSER LENS PCX	OPPX-00001	1
12	RETAINING NUT	PCFI-00070	1



SO-111 LAMPHOUSE MOUNTING ASSEMBLY SHOWING TOP CABLE LAMPHOUSE AND MOUNTING CHANNELS

SERVICE MANUAL
111
S2
SCAN OPTICS
Drawn by: RJK
Date:30/5/2

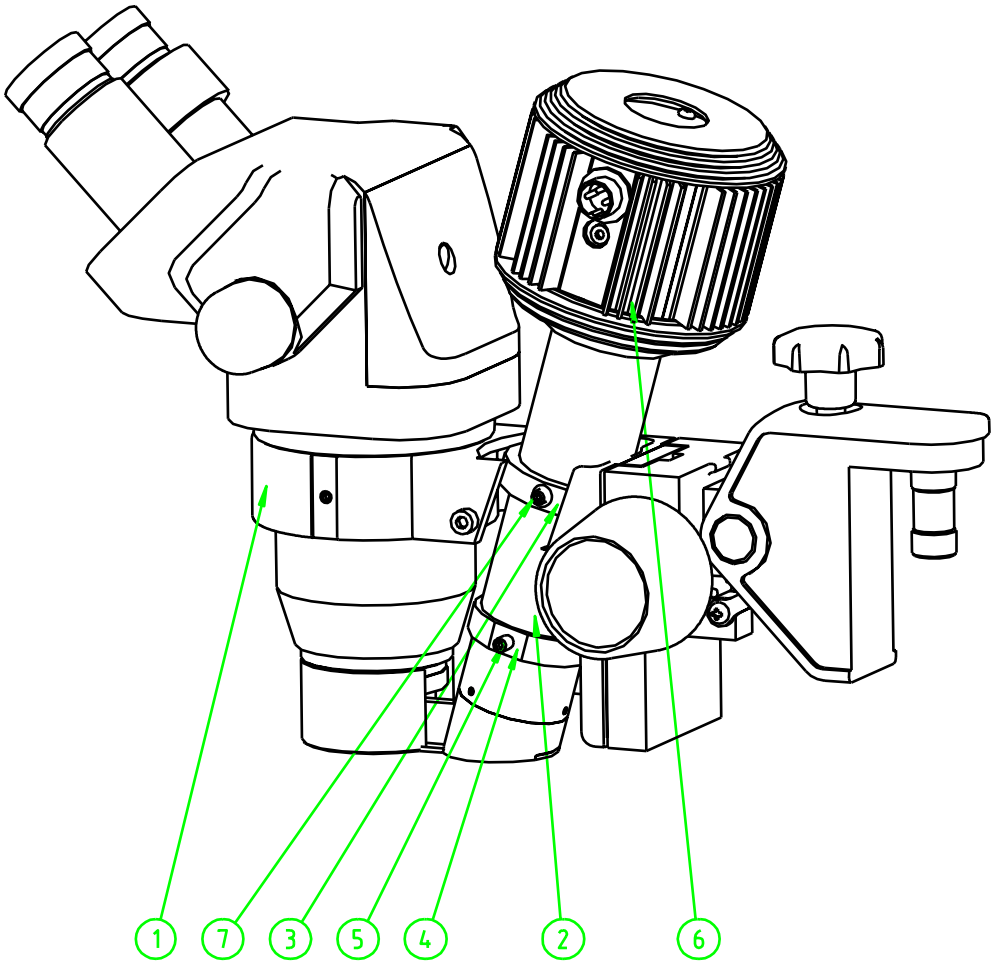
Item	Name	Part Number	Qty
1	M5 X 10 GRUBSCREW	FAGS-05010	4
2	MICROSCOPE HEAD		1
3	MOUNT CHANNEL 3 POINT		1
4	LAMPHOUSE		1
5	MOUNT CHANNEL 1 POINT		1
6	BONDER ARM		1



SO-111 LAMPHOUSE
RING MOUNTING ASSEMBLY
Note: Sections of the bonder arm and BAM mounting bracket have been removed for clarity

SERVICE MANUAL
SCAN OPTICS
111
S3
Drawn by: RJK
Date:02/08/02

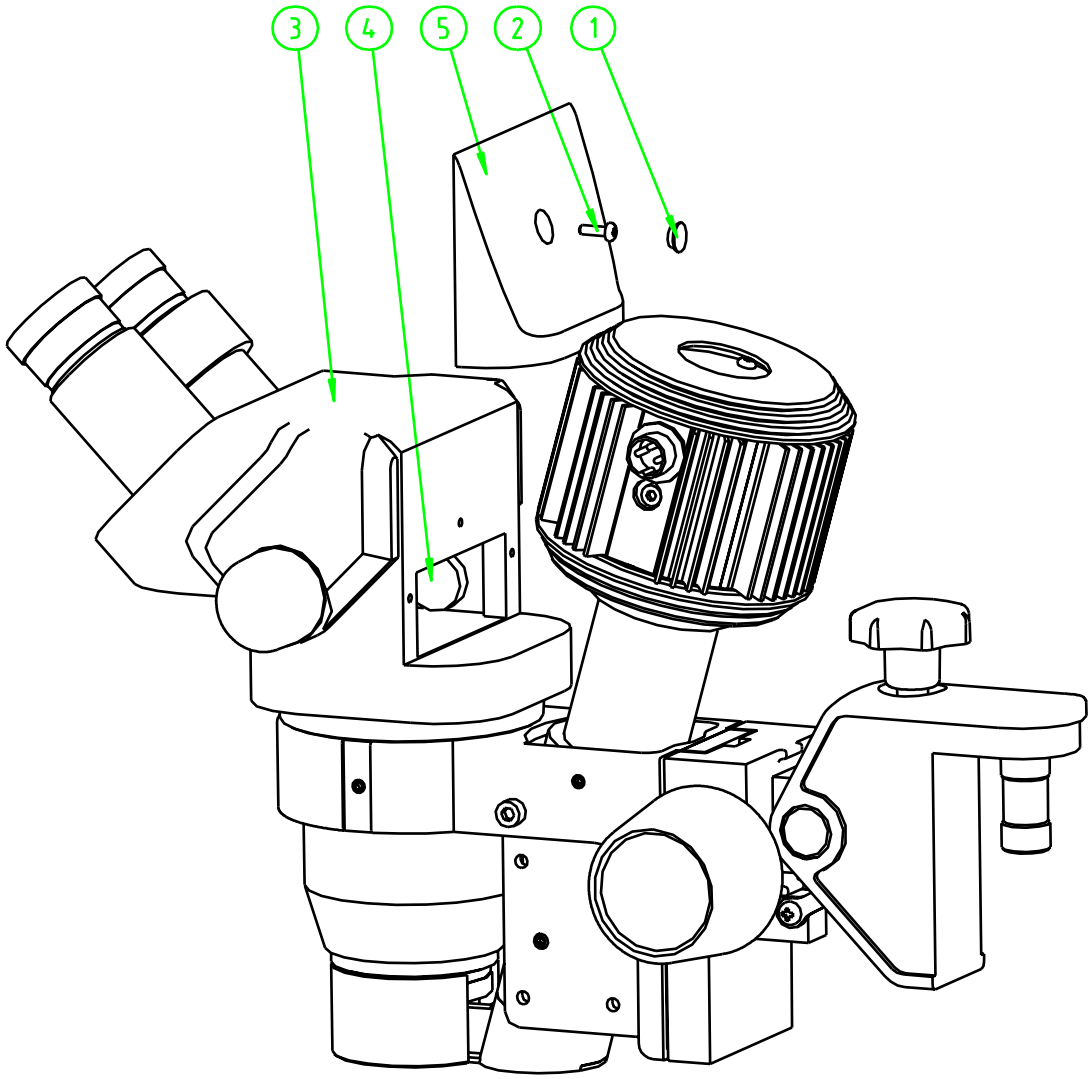
Item	Name	Part Number	Qty
1	BONDER ARM	PCFI-00049	1
2	BAM MTG BRACKET	PCFI-00077	1
3	UPPER MOUNTING RING	PCFI-00075	1
4	LOWER MOUNTING RING	PCFI-00076	1
5	M5 X 8 KNURLED CUP GRUBSCREW	FAGS-05108	2
6	LAMPHOUSE	SAFI-00014	1
7	M5 X 10 GRUBSCREW	FAGS-05010	2



SO-111 MOULD PELLET REPLACEMENT

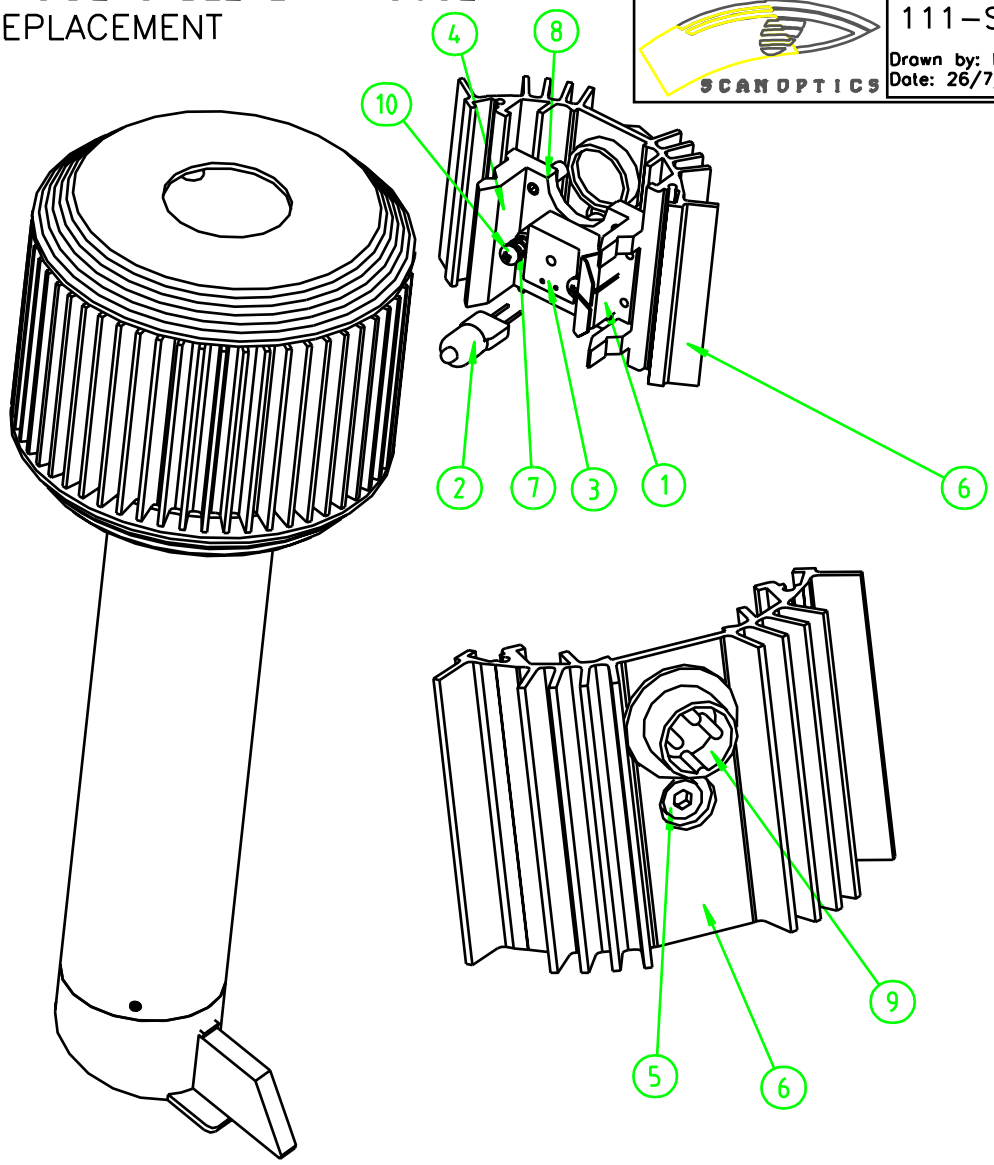
SERVICE MANUAL
111
S4
Drawn by: RJK
Date:01/08/02
SCAN OPTICS

Item	Name	Part Number	Qty
1	COVER PLUG	-	1
2	M3 SCREW WITH WASHER SET	-	1
3	SZ40 MICROSCOPE HEAD	OCOL-00002	1
4	KABINON ANTI MOULD PELLET	OCOL-00004	1
5	SZ 40 BACK COVER	-	1



SO-111 SIDE CABLE LAMPHOUSE LAMP REPLACEMENT

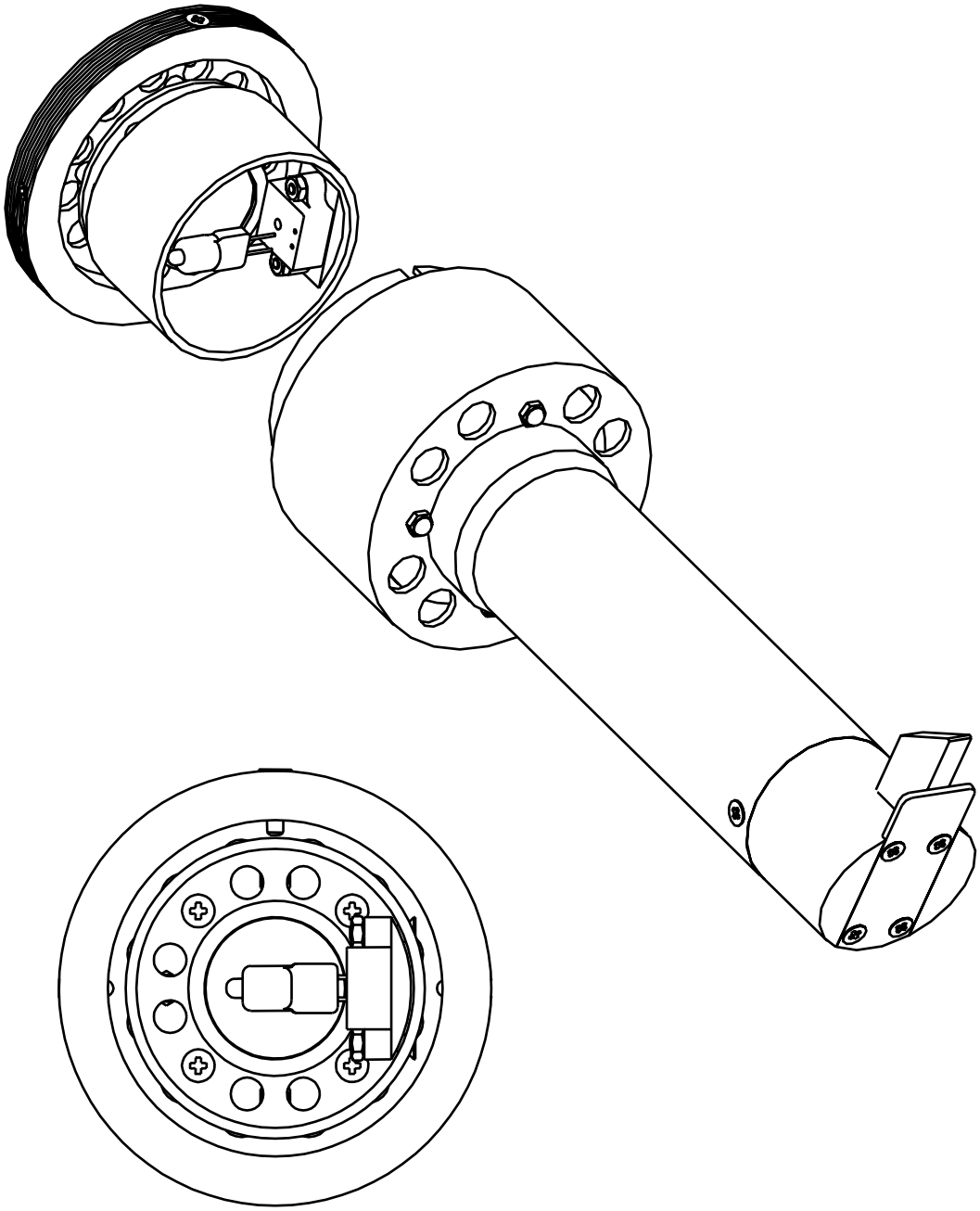
SERVICE MANUAL
SCAN OPTICS
111-S5
Drawn by: RJK
Date: 26/7/02



Item	Name	Part Number	Qty
1	SPRING LATCH	PCFI-00057	1
2	12V 20W GE M47 LAMP	OCLP-00001	1
3	LAMPHOLDER 216	OCLH-00001	1
4	LAMPHOLDER CARRIER	PCFI-00068	1
5	BULB ADJUSTMENT SCREW	PCFI-00065	1
6	COOLING FIN DOOR	PCFI-00064	1
7	SPRING	PCFI-00066	2
8	M4 X 12 GRUBSCREW	FAGS-04012	3
9	3 WAY PANEL PLUG	ECCN-00001	1
10	M2.5X16 PAN HEAD	FAPN-02516	2

SO-111 TOP CABLE LAMPHOUSE
LAMP REPLACEMENT

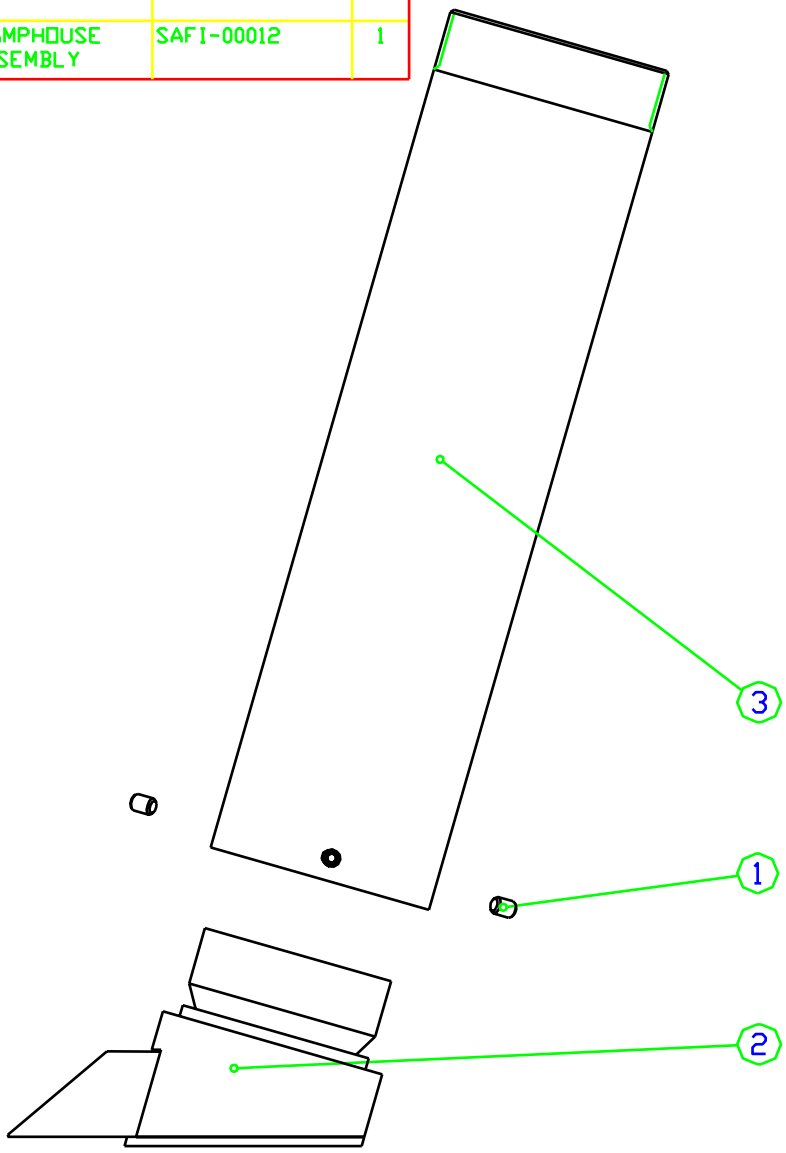
SERVICE MANUAL
SCAN OPTICS
111-S6
Drawn by: RJK
Date: 26/7/02



SO-5000 LAMPHOUSE BARREL AND PRISM HOLDER ASSEMBLY

SERVICE MANUAL
SCAN OPTICS
5000
S1
Drawn by: RJK
Date:30/5/2

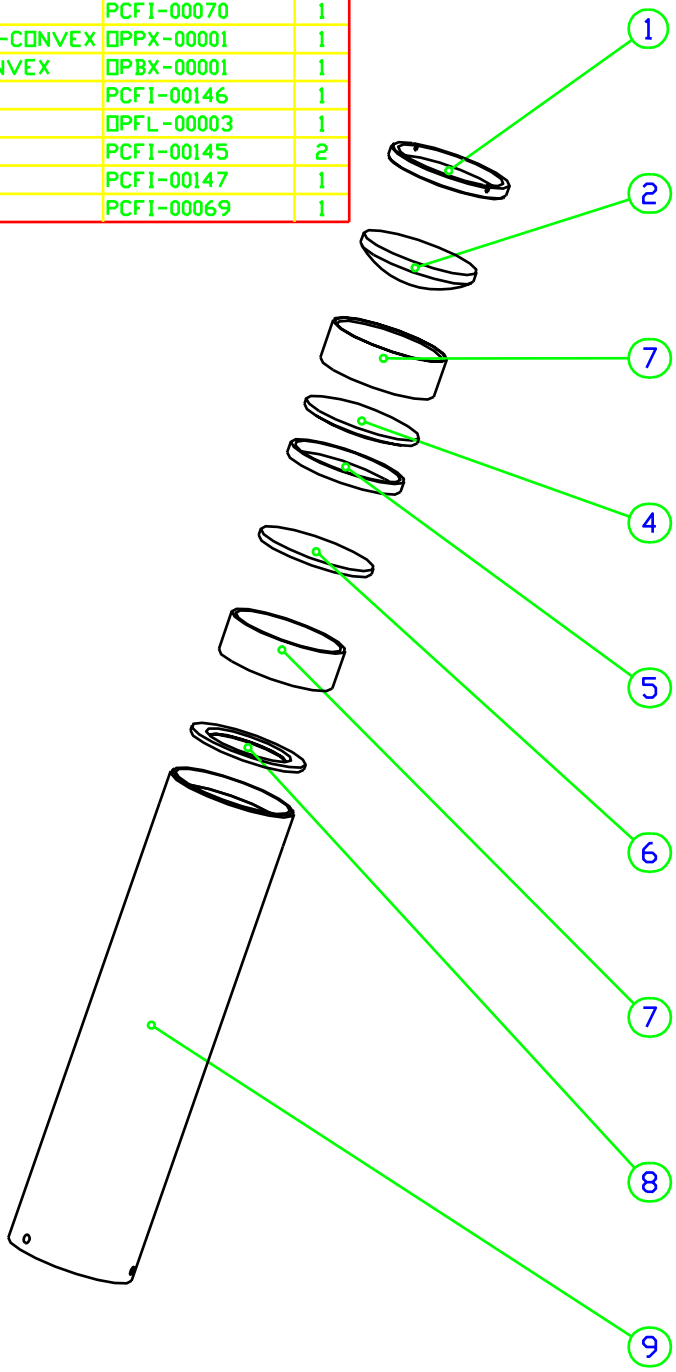
ITEM	DESCRIPTION	PART NO	QTY
1	M3 X 4 GRUBSCREW	FAGS-03004	3
2	SO-5000 PRISM HOLDER ASSEMBLY	SAFI-00013	1
3	SO-5000 LAMPHOUSE BARREL ASSEMBLY	SAFI-00012	1



SO-5000 LAMPHOUSE BARREL ASSEMBLY

SERVICE MANUAL
SCAN OPTICS
5000
S2
Drawn by: RJK
Date:30/5/02

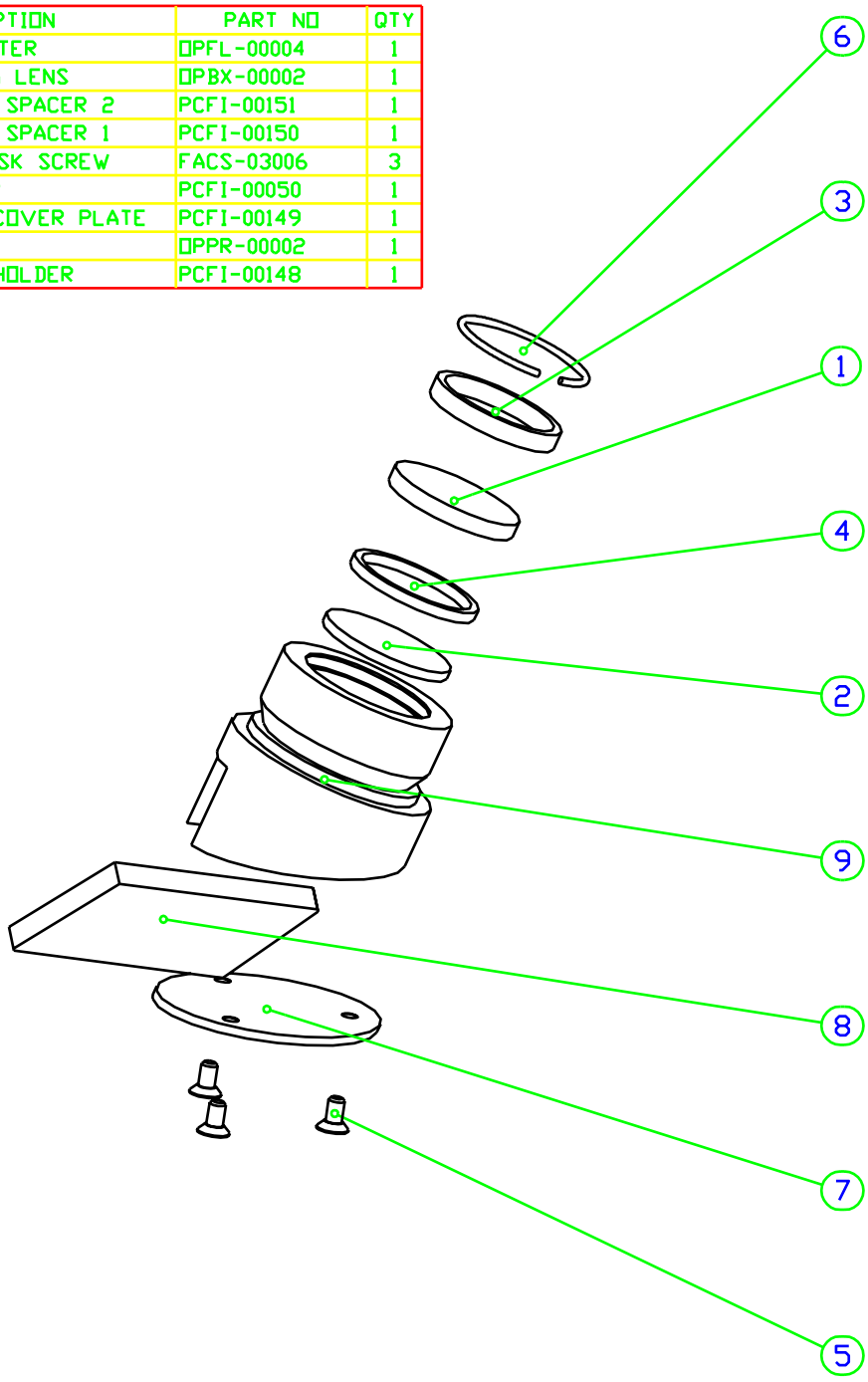
ITEM	DESCRIPTION	PART NO	QTY
1	RETAINING NUT	PCFI-00070	1
2	CONDENSER LENS PLANO-CONVEX	OPPX-00001	1
4	CONDENSER LENS BI-CONVEX	OPBX-00001	1
5	LENS BARREL SPACER 2	PCFI-00146	1
6	HEAT FILTER	OPFL-00003	1
7	LENS BARREL SPACER 1	PCFI-00145	2
8	APERTURE	PCFI-00147	1
9	LENS BARREL	PCFI-00069	1



SO-5000 PRISM HOLDER ASSEMBLY

SERVICE MANUAL
5000
S3
Drawn by: RJK
Date:30/5/2
SCAN OPTICS

ITEM	DESCRIPTION	PART NO	QTY
1	UV FILTER	PFL-00004	1
2	IMAGING LENS	PBX-00002	1
3	FILTER SPACER 2	PCFI-00151	1
4	FILTER SPACER 1	PCFI-00150	1
5	M3X6 CSK SCREW	FACS-03006	3
6	CIRCLIP	PCFI-00050	1
7	PRISM COVER PLATE	PCFI-00149	1
8	PRISM	PPR-00002	1
9	PRISM HOLDER	PCFI-00148	1

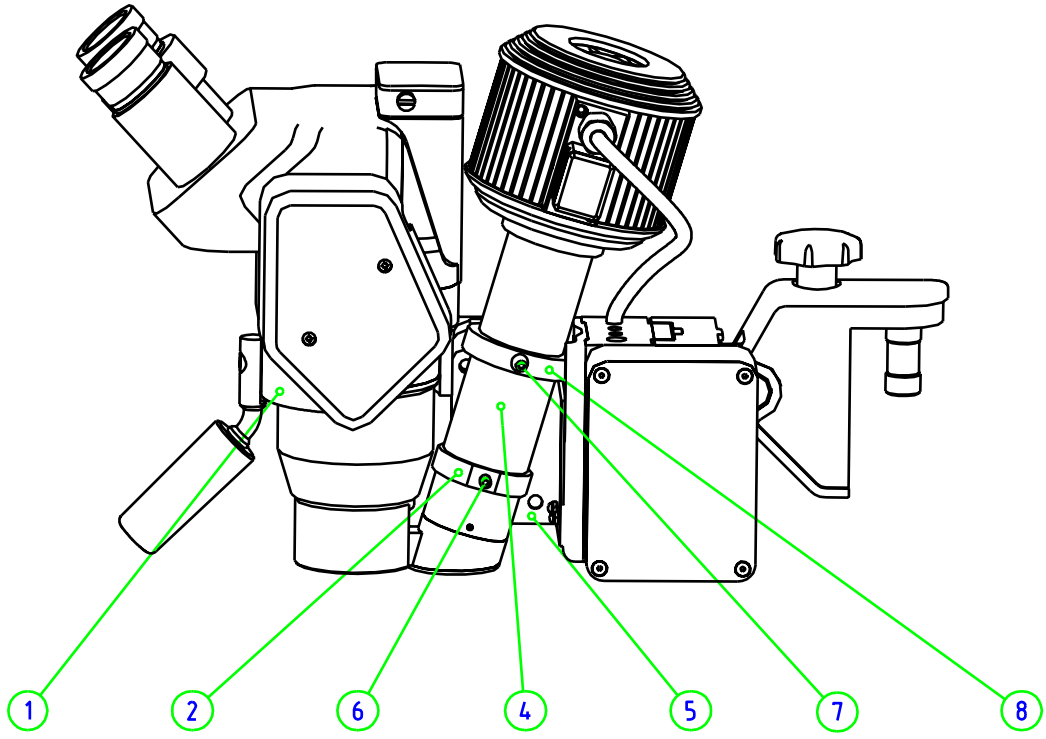


SO-5000 LAMPHOUSE MOUNTING ASSEMBLY

Note: Sections of the bonder arm and BAM mounting bracket have been removed for clarity

SERVICE MANUAL
SCAN OPTICS
5000
S4
Drawn by: RJK
Date:1/6/2

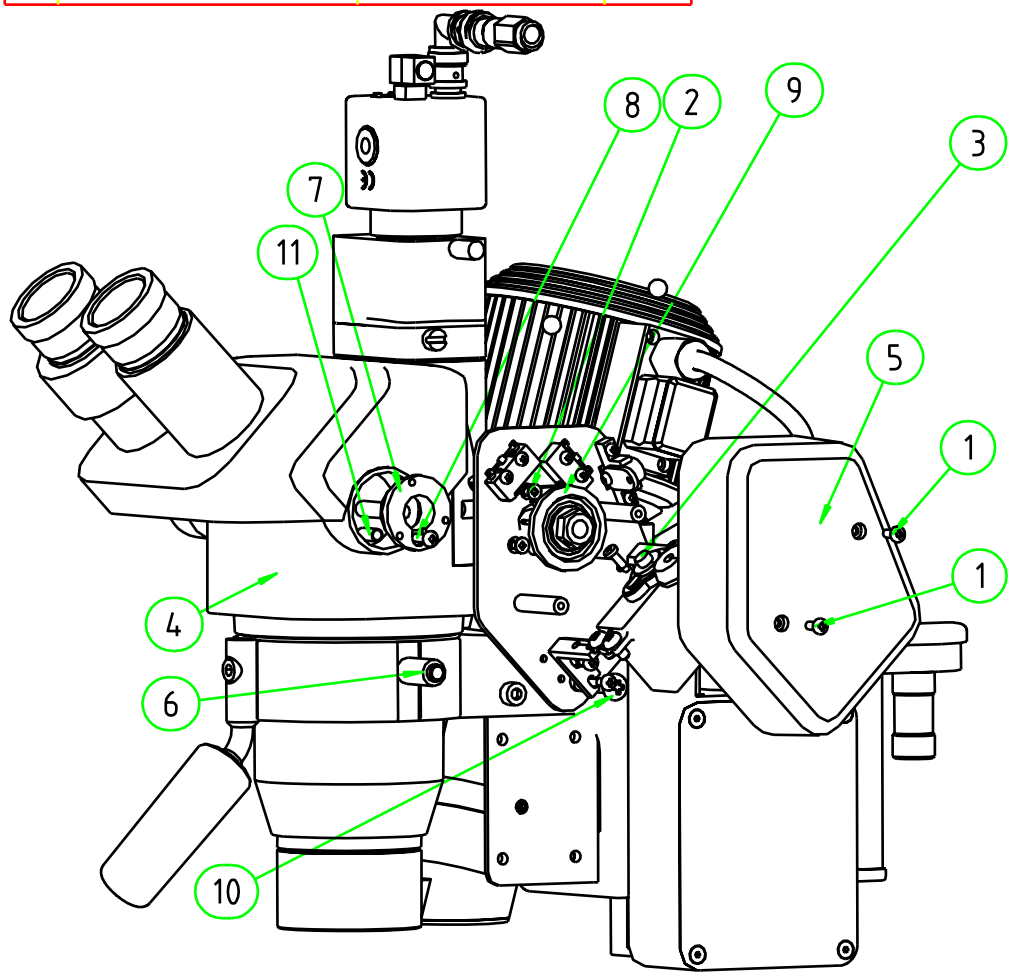
Parts List			
ITEM	DESCRIPTION	PART NO	QTY
1	BONDER ARM	PCFI-00093	1
2	LOWER MOUNTING RING	PCFI-00076	1
4	LAMPHOUSE	SAFI-00043	1
5	BAM MOUNTING BRACKET	PCFI-00077	1
6	M5 X 8 KNURLED CUP GRUBSCREW	FAGS-05108	2
7	M5 X 10 GRUBSCREW	FAGS-05010	2
8	UPPER MOUNTING RING	PCFI-00075	1



SO-5000 ZOOM ASSEMBLY
SHEET 1

SERVICE MANUAL
SCAN OPTICS
5000
S5-1
Drawn by: RJK
Date:02/07/02

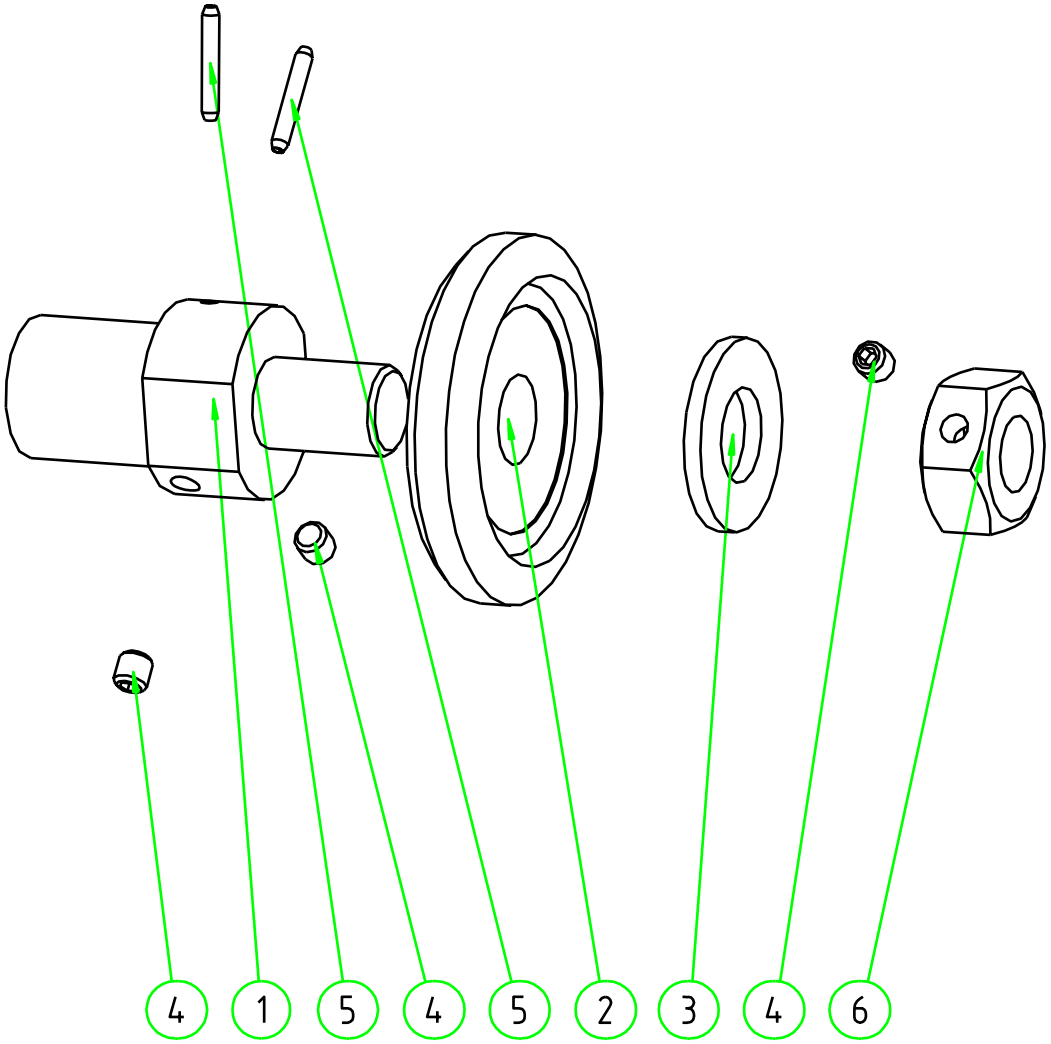
Item	Name	Part No	Qty
1	M3 X 8 PANHEAD SCREW	FAPN-03008	2
2	M3 X 6 COUNTERSUNK SCREW	FACS-03006	3
3	ZOOM DRIVE ASSEMBLY	SAFI-00036 (sheet 3)	1
4	MICROSCOPE HEAD	OCOL-00002	1
5	ZOOM COVER	PCFI-00122	1
6	ZOOM SPACER 3	PCFI-00119	1
7	TOP HAT	PCFI-00117	1
8	M3 X 20 PANHEAD SCREW	FAPN-03020	1
9	ZOOM SHAFT ADAPTER ASSEMBLY	See sheet 2	1
10	M5 X 25 PANHEAD SCREW	FAPN-05025	1
11	ZOOM SPACER 1	PCFI-00115	1



SO-5000 ZOOM ASSEMBLY
SHEET 2

SERVICE MANUAL
SCANOPTICS
5000
S5-2
Drawn by: RJK
Date:02/07/02

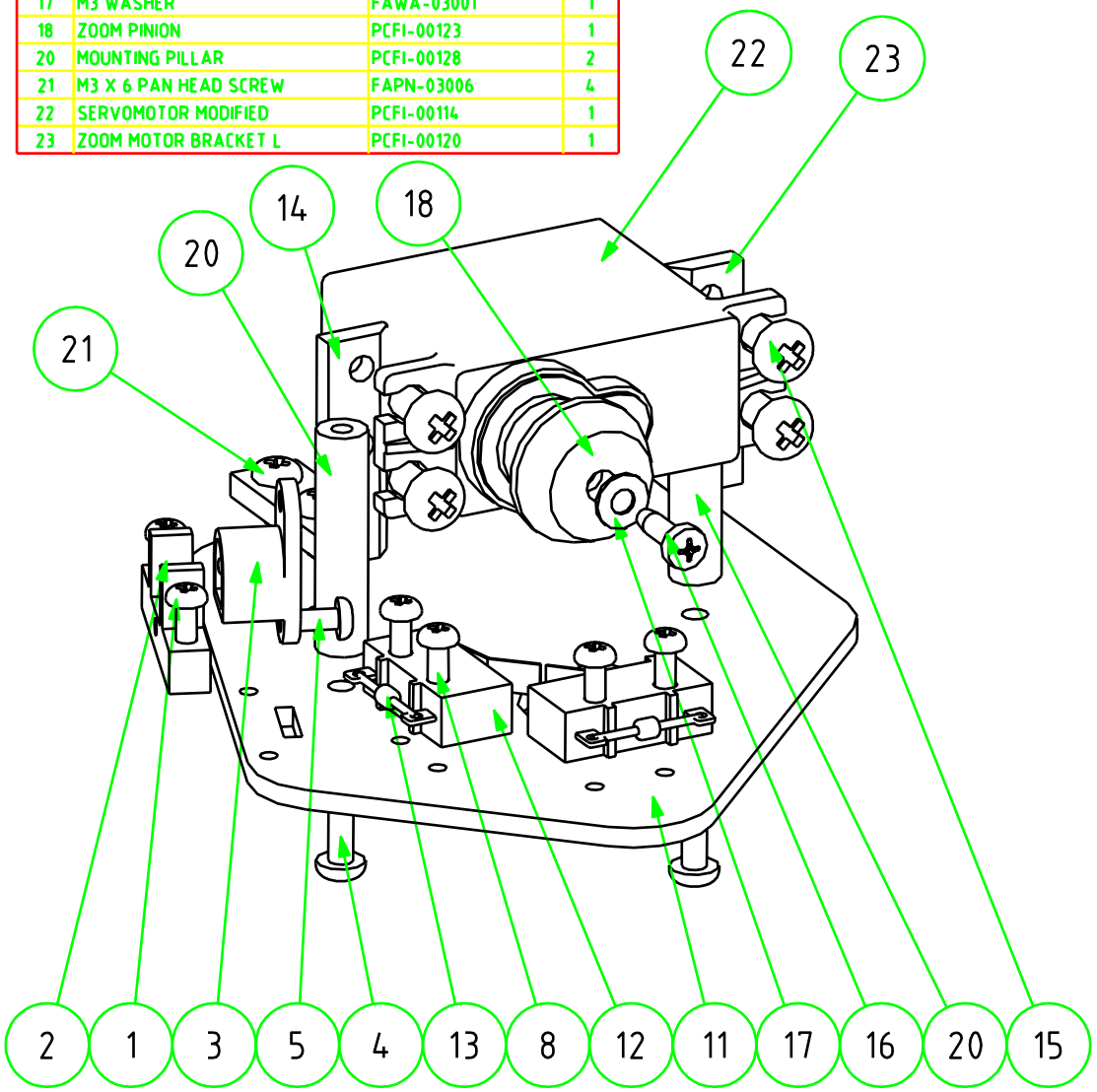
Item	Name	Part No	Qty
1	ZOOM SHAFT ADAPTER	PCFI-00118	1
2	ZOOM BEVEL GEAR	PCFI-00124	1
3	M8 WASHER	FAWA-08001	1
4	M3 X 3 GRUBSCREW	FAGS-03003	3
5	M1.5 X 10 SPRING PIN	FASP-01510	2
6	ZOOM SECURING NUT	PCFI-00125	1



SO-5000 ZOOM ASSEMBLY
SHEET 3

SERVICE MANUAL
5000
S5-3
Drawn by: RJK
Date:02/07/02
SCANOPTICS

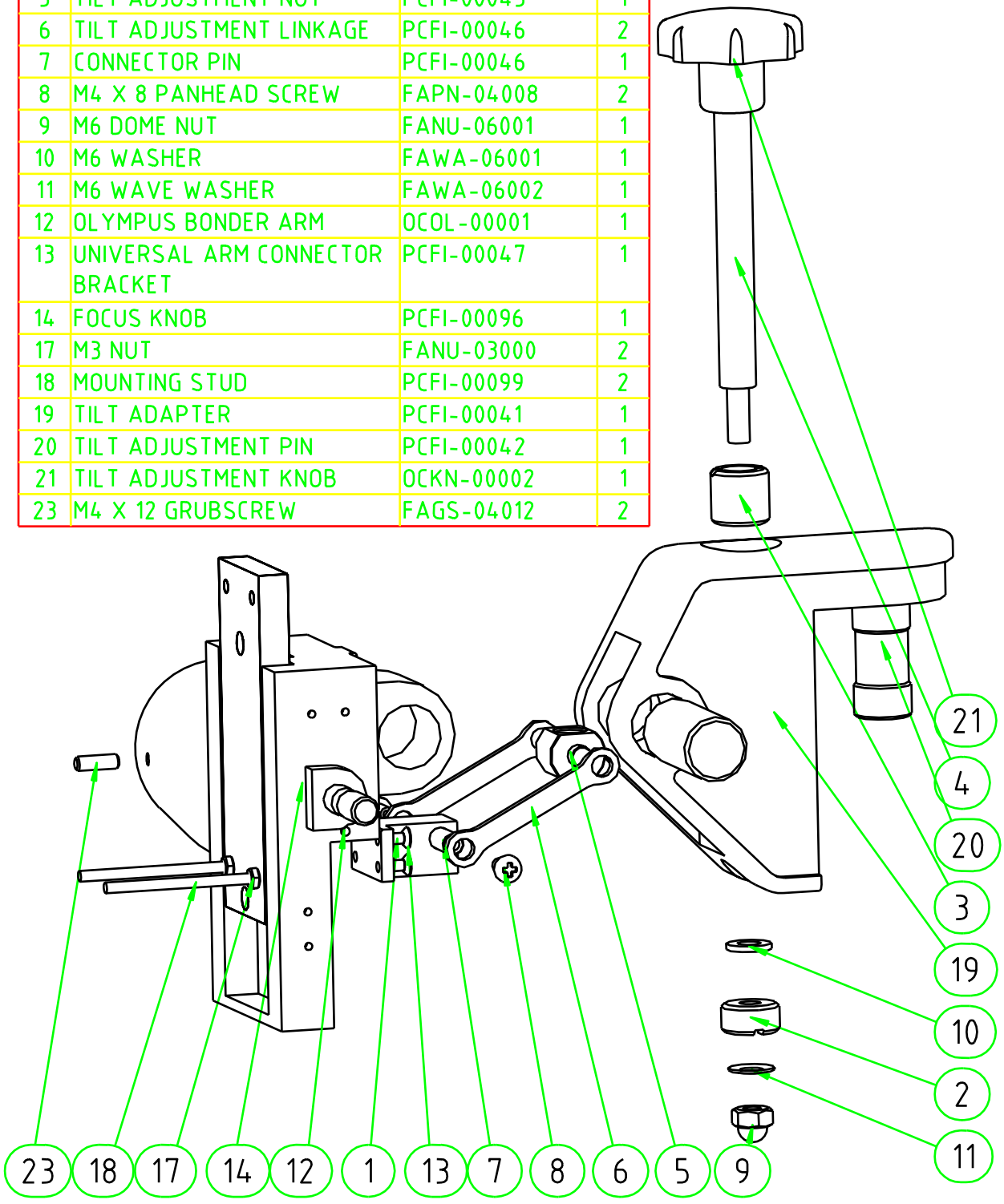
ITEM	DESCRIPTION	Part No	QTY
1	DC SOCKET MOUNT	PCFI-00127	1
2	M2.5 X 8 PAN HEAD SCREW	FAPN-02508	2
3	DC SOCKET	ECCN-00020	1
4	M3 X 8 PAN HEAD SCREW	FAPN-03008	2
5	M2.5 X 6 PAN HEAD SCREW	FAPN-02506	1
8	M2.5 X 10 PAN HEAD SCREW	FAPN-02510	4
11	ZOOM MOUNTING PLATE	PCFI-00116	1
12	MICROSWITCH	ECSW-00003	2
13	DIODE	ECDI-0001	2
14	ZOOM MOTOR BRACKET R	PCFI-00121	1
15	M4X8 PAN HEAD SCREW	FAPN-04008	4
16	4AB x 3/8" SELF TAP SCREW	FAST-04038	1
17	M3 WASHER	FAWA-03001	1
18	ZOOM PINION	PCFI-00123	1
20	MOUNTING PILLAR	PCFI-00128	2
21	M3 X 6 PAN HEAD SCREW	FAPN-03006	4
22	SERVOMOTOR MODIFIED	PCFI-00114	1
23	ZOOM MOTOR BRACKET L	PCFI-00120	1



SO–5000 TILT ADJUSTMENT ASSEMBLY

SERVICE MANUAL
SCAN OPTICS
5000
S6
Drawn by: RJK
Date:02/07/02

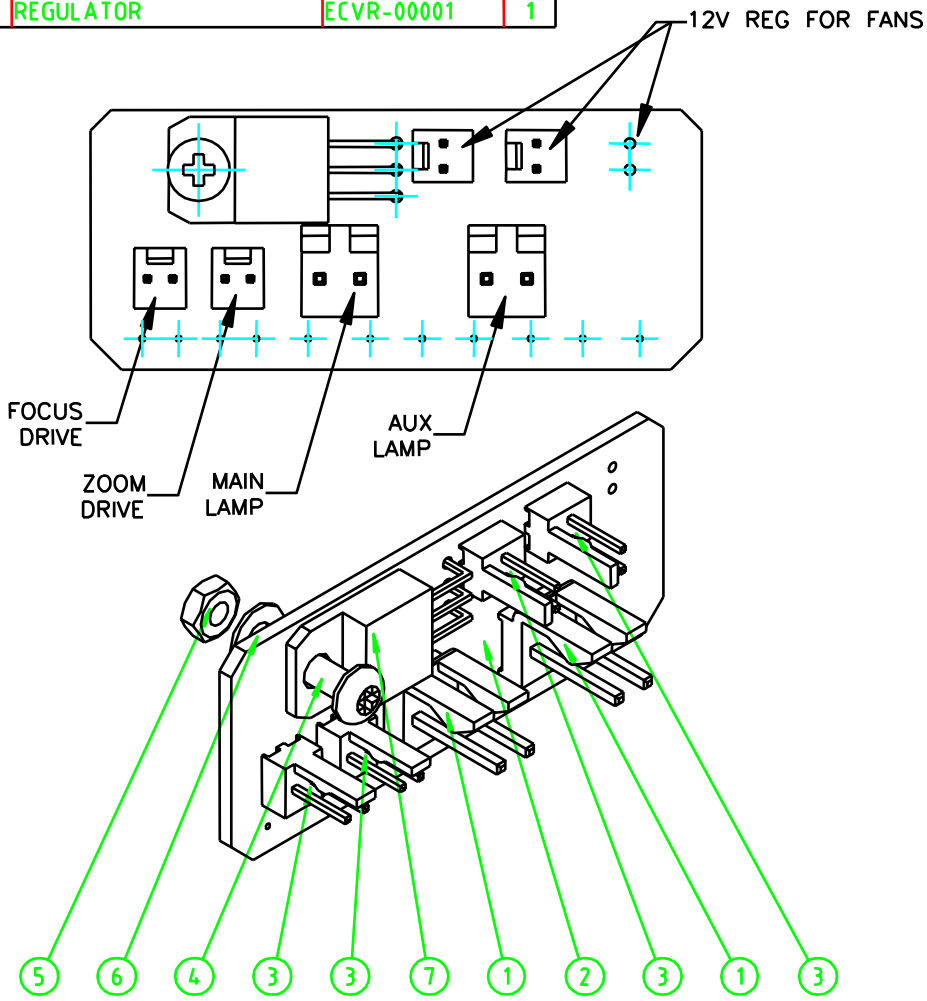
Item	Name	Part No	Qty
1	M3 X 6 CSK SCREW	FACS-03006	4
2	GS ADJUSTMENT BEARING 2	PCFI-00022	1
3	TILT ADJUSTMENT BUSH 1	PCFI-00044	1
4	TILT ADJUSTMENT SHAFT	PCFI-00043	1
5	TILT ADJUSTMENT NUT	PCFI-00045	1
6	TILT ADJUSTMENT LINKAGE	PCFI-00046	2
7	CONNECTOR PIN	PCFI-00046	1
8	M4 X 8 PANHEAD SCREW	FAPN-04008	2
9	M6 DOME NUT	FANU-06001	1
10	M6 WASHER	FAWA-06001	1
11	M6 WAVE WASHER	FAWA-06002	1
12	OLYMPUS BONDER ARM	OCOL-00001	1
13	UNIVERSAL ARM CONNECTOR BRACKET	PCFI-00047	1
14	FOCUS KNOB	PCFI-00096	1
17	M3 NUT	FANU-03000	2
18	MOUNTING STUD	PCFI-00099	2
19	TILT ADAPTER	PCFI-00041	1
20	TILT ADJUSTMENT PIN	PCFI-00042	1
21	TILT ADJUSTMENT KNOB	OCKN-00002	1
23	M4 X 12 GRUBSCREW	FAGS-04012	2



SO-5000 CONNECTOR BLOCK ASSEMBLY SHEET 1

SERVICE MANUAL
SCANOPTICS
5000
S7-1
Drawn by: RJK
Date:02/07/02

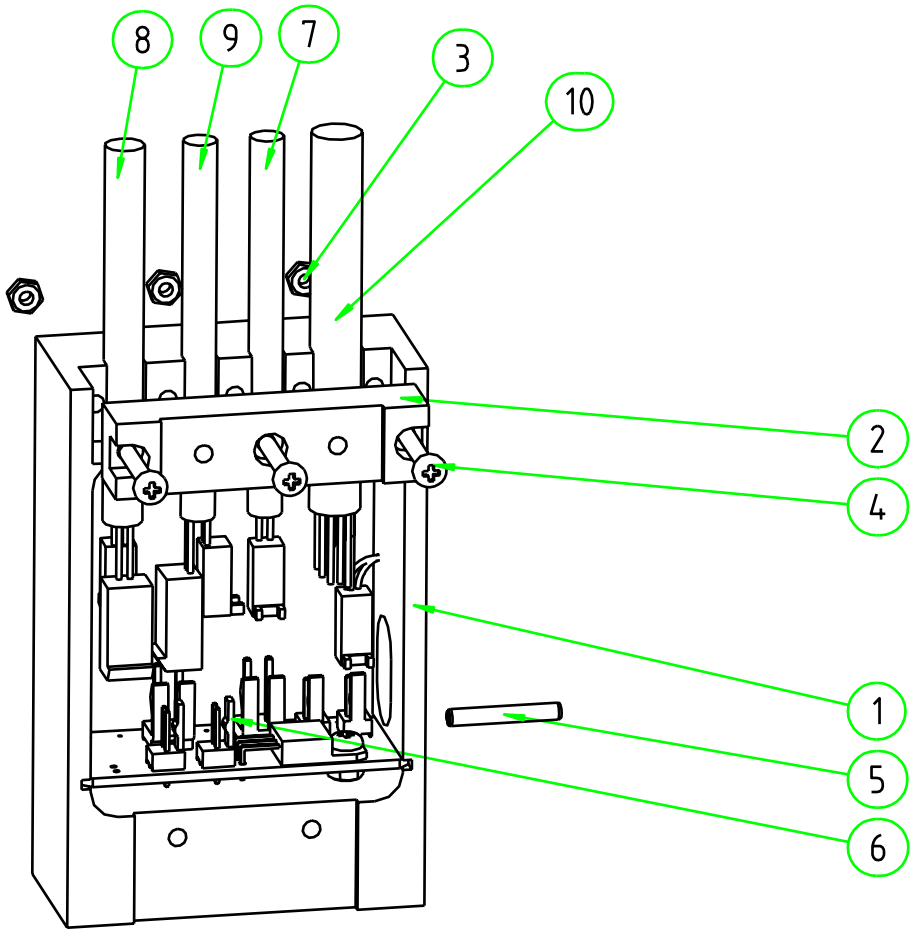
Parts List			
Item	Name	Part No	Qty
1	LARGE 2 PIN HEADER	ECCN-00017	2
2	CONNECTOR BLOCK PCB	ECCB-00002	1
3	SMALL 2 PIN HEADER	ECCN-00006	4
4	M3 X 6 PANHEAD SCREW	FAPN-03006	1
5	M3 NUT	FANU-03000	1
6	M3 WASHER PLAIN	FAWA-03001	1
7	REGULATOR	ECVR-00001	1



SO-5000 CONNECTOR BLOCK ASSEMBLY SHEET 2

SERVICE MANUAL
SCANOPTICS
5000
S7-2
Drawn by: RJK
Date:02/07/02

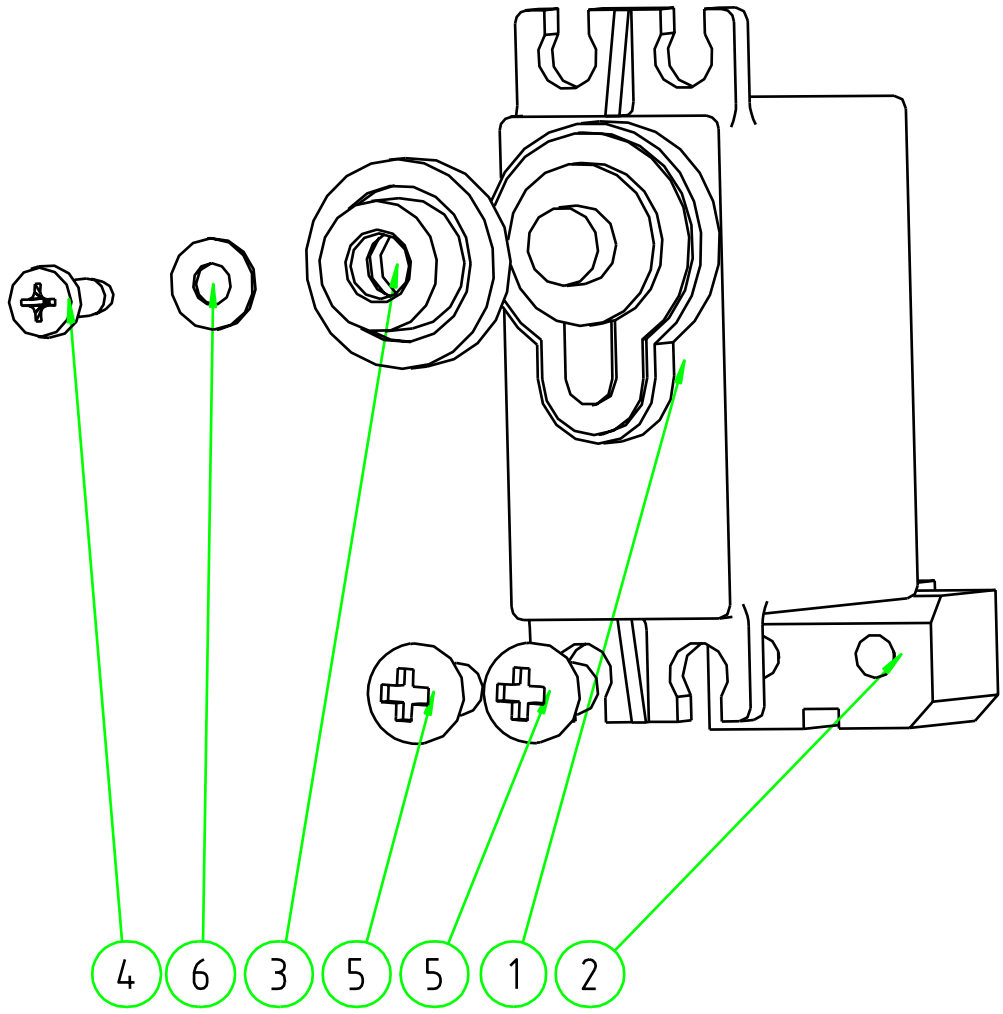
Item	Name	Part No	Qty
1	CONNECTOR BLOCK	PCFI-00097	1
2	CONNECTOR BLOCK CLAMP BAR	PCFI-00098	1
3	M3 NUT	FANU-03000	3
4	M3 X 20 PANHEAD SCREW	FAPN-03020	3
5	M3 x 20 SPRING PIN	FASP-03020	1
6	5000 CONNECTOR BLOCK PCB ASSEMBLY	-	1
7	ZOOM CABLE	SAFI-00037	1
8	LAMPHOUSE CABLE	-	1
9	AUXILIARY LIGHT CABLE	-	1
10	PILLAR CABLE	-	1



SO-5000 FOCUS ASSEMBLY
SHEET 1

SERVICE MANUAL
SCAN OPTICS
5000
S8-1
Drawn by: RJK
Date:02/07/02

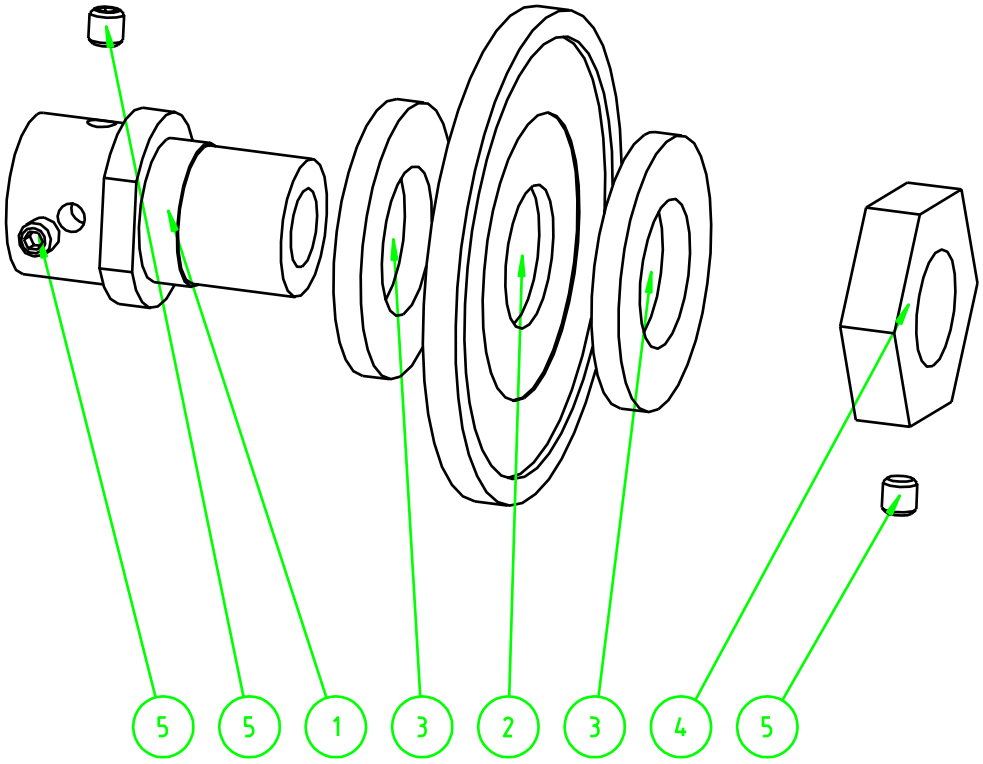
Item	Name	Part No	Qty
1	SERVOMOTOR MODIFIED	PCFI-00114	1
2	MOTOR BRACKET	PCFI-00107	1
3	FOCUS PINION	PCFI-00112	1
4	4AB x 3/8" SELF TAPPING SCREW	FAST-04038	1
5	M4 X 8 PANHEAD SCREW	FAPN-04008	2
6	M3 WASHER	FAWA-03001	1



SO-5000 FOCUS ASSEMBLY
SHEET 2

SERVICE MANUAL
SCANOPTICS
5000
S8-2
Drawn by: RJK
Date:09/07/02

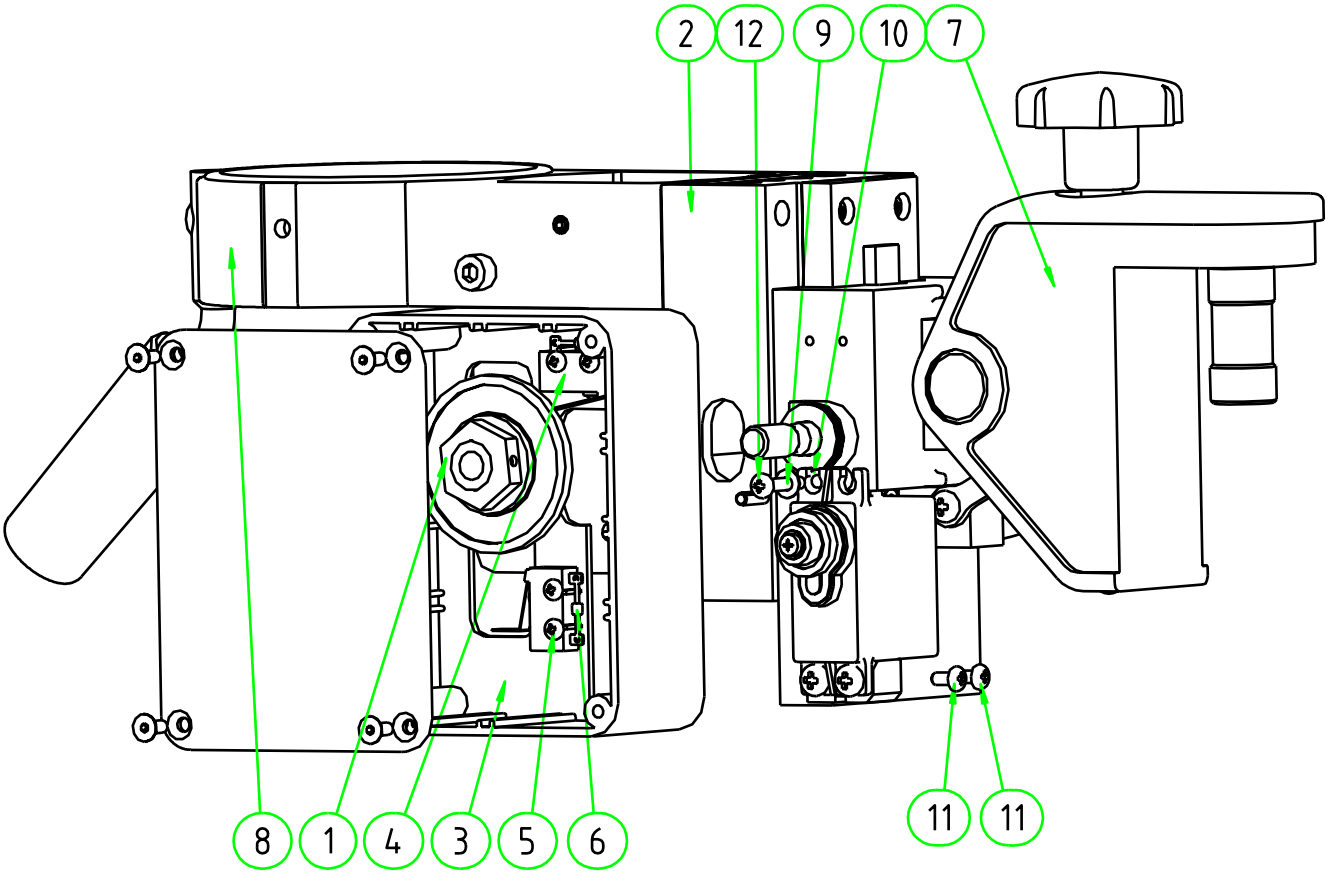
Item	Name	Part No	Qty
1	FOCUS SHAFT ADAPTER	PCFI-00109	1
2	FOCUS GEAR	PCFI-00113	1
3	M12 STAINLESS WASHER	FAWA-12001	2
4	SECURING NUT	PCFI-00111	1
5	M3X3 GRUBSCREW	FAGS-03003	3



SO–5000 FOCUS ASSEMBLY
SHEET 3

SERVICE MANUAL
SCAN OPTICS
5000
S8–3
Drawn by: RJK
Date:10/07/02

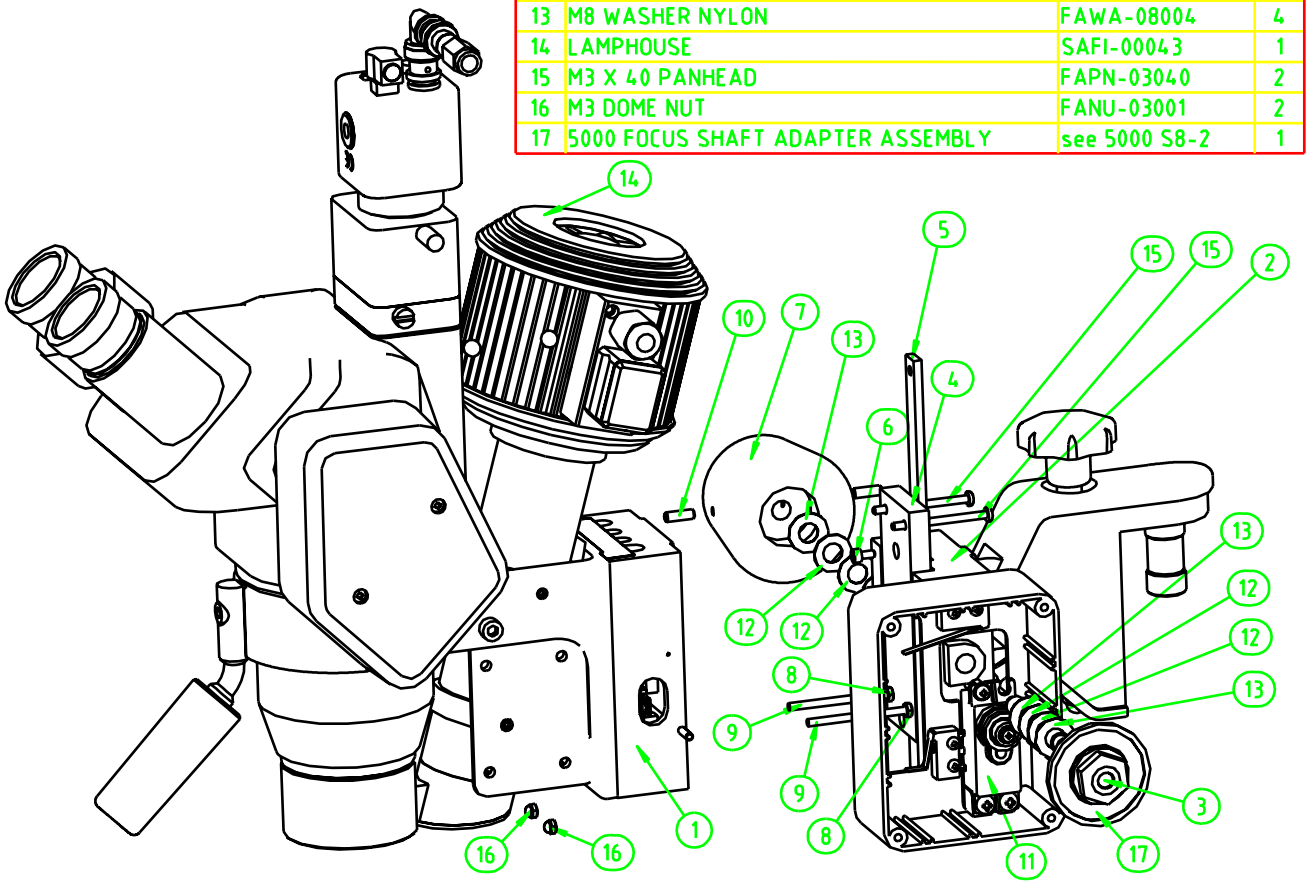
Item	Name	Part No	Qty
1	5000 FOCUS SHAFT ADAPTER ASSEMBLY	See 5000 S8 sheet 2	1
2	5000 CONNECTOR BLOCK ASSEMBLY	See 5000 S7	1
3	FOCUS COVER	PCFI-00110	1
4	MICROSWITCH	ECSW-00003	2
5	M2.5 X 12 PANHEAD SCREW	FAPN-02512	4
6	DIODE	ECDI-0001	2
7	5000 TILT ADJUSTMENT ASSEMBLY	See 5000 S6	1
8	BONDER ARM	PCFI-00093	1
9	M3 WASHER	FAWA-03001	1
10	FOCUS SPACER	PCFI-00108	1
11	M3 X 8 PANHEAD SCREW	FAPN-03008	2
12	M3 X16 PANHEAD SCREW	FAPN-03016	1



SO-5000 FOCUS ASSEMBLY
SHEET 4

SERVICE MANUAL
SCAN OPTICS
5000
S8-4
Drawn by: RJK
Date:10/07/02

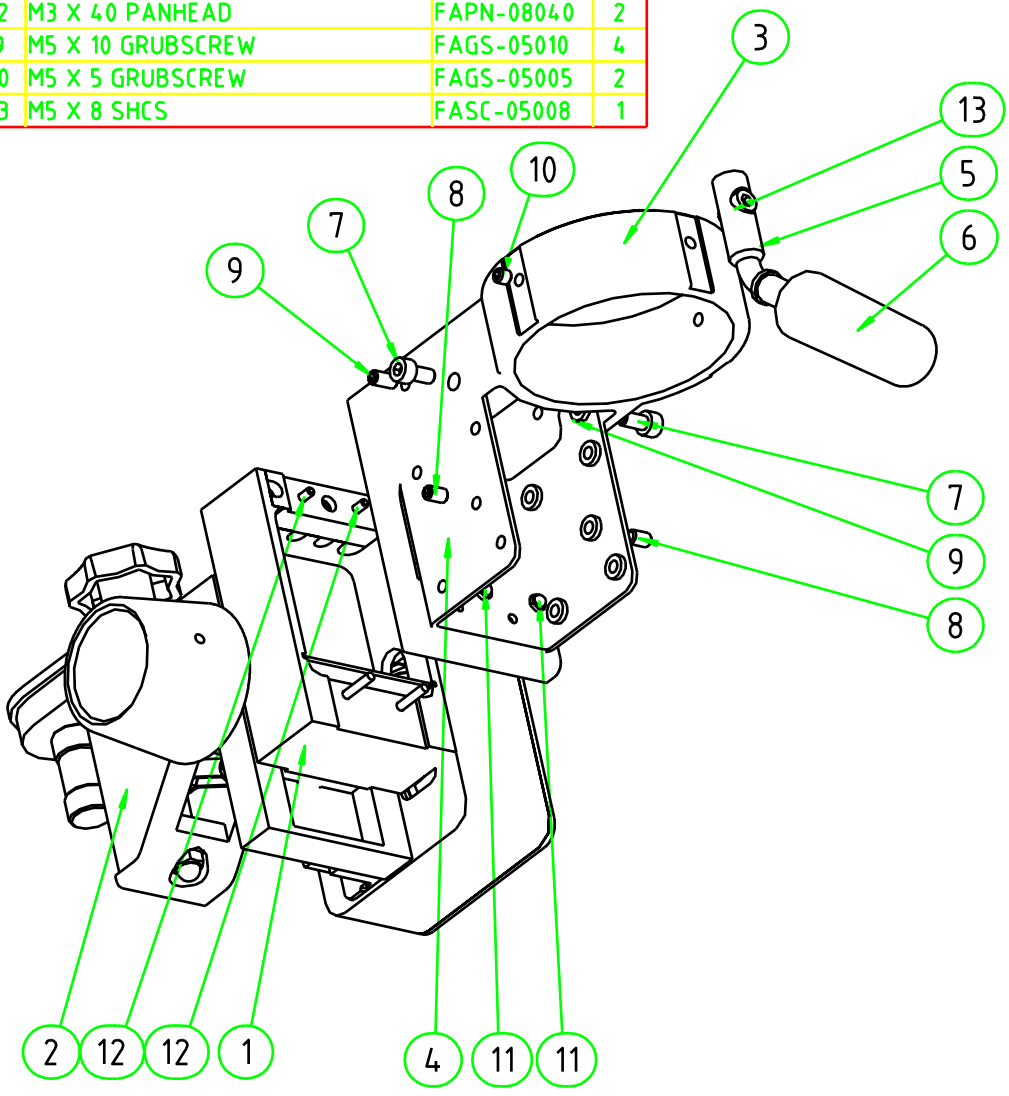
Item	Name	Part No	Qty
1	5000 CONNECTOR BLOCK ASSEMBLY	see 5000 S7-2	1
2	5000 BONDER ARM	PCFI-00093	1
3	SZ-STB1 FOCUS SHAFT	avail on request	1
4	SLIDER	avail on request	1
5	RACK	avail on request	1
6	M3 X 6 SHCS	FASC-03006	2
7	5000 FOCUS KNOB MODIFIED	PCFI-00096	1
8	M3 NUT	FANU-03000	2
9	MOUNTING STUD	PCFI-00099	2
10	M4 X 12 GRUBSCREW	FAGS-04012	2
11	5000 FOCUS MOTOR ASSEMBLY	see 5000 S8-1	1
12	M8 WASHER BELLEVILLE	FAWA-08003	4
13	M8 WASHER NYLON	FAWA-08004	4
14	LAMPHOUSE	SAFI-00043	1
15	M3 X 40 PANHEAD	FAPN-03040	2
16	M3 DOME NUT	FANU-03001	2
17	5000 FOCUS SHAFT ADAPTER ASSEMBLY	see 5000 S8-2	1



SO–5000 BONDER ARM ASSEMBLY

SERVICE MANUAL 5000 S9
SCAN OPTICS
Drawn by: RJK
Date:09/07/02

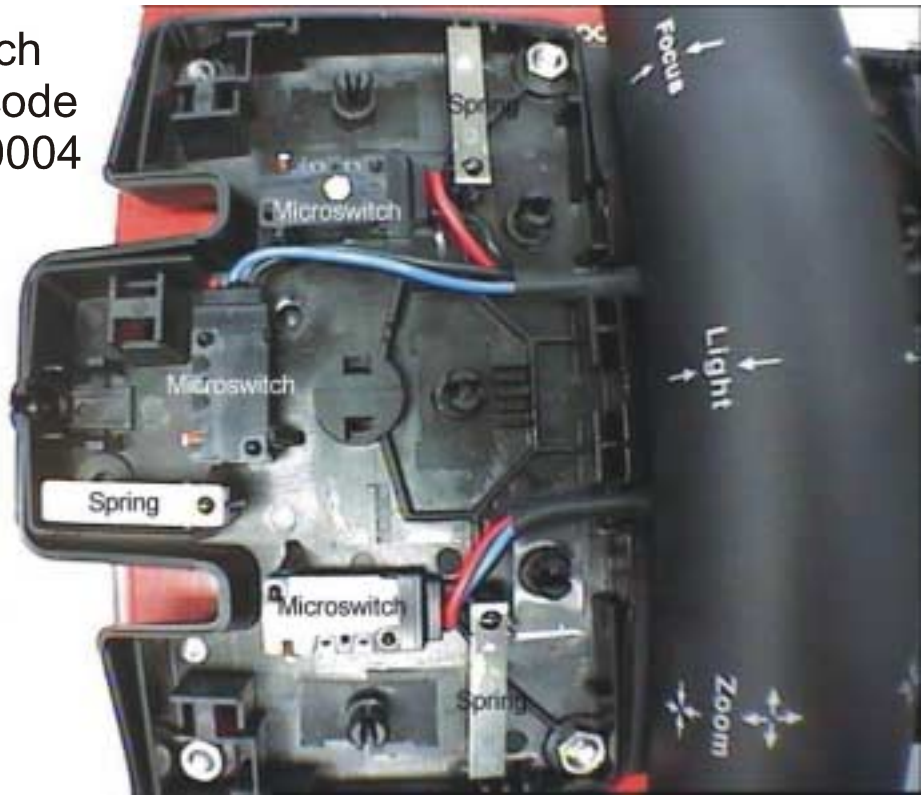
Item	Name	Part No	Qty
1	5000 CONNECTOR BLOCK ASSEMBLY	See 5000 S7	1
2	5000 TILT ADJUSTMENT ASSEMBLY	See 5000 S6	1
3	BONDER ARM	PCFI-00093	2
4	BAM MOUNTING BRACKET	PCFI-00077	2
5	GUIDE HANDLE	PCFI-00094	2
6	GUIDE HANDLE GRIP	PCFI-00095	2
7	M5 X 10 SHCS	FASC-05010	5
8	M5 X 8 KNURLED CUP GRUBSCREW	FAGS-05108	4
11	M3 DOME NUT	FANU-03001	2
12	M3 X 40 PANHEAD	FAPN-08040	2
9	M5 X 10 GRUBSCREW	FAGS-05010	4
10	M5 X 5 GRUBSCREW	FAGS-05005	2
13	M5 X 8 SHCS	FASC-05008	1



SO-5000 FOOT CONTROL

SERVICE MANUAL
5000
S-10
Drawn by: RJK
Date:02/07/02
SCAN OPTICS

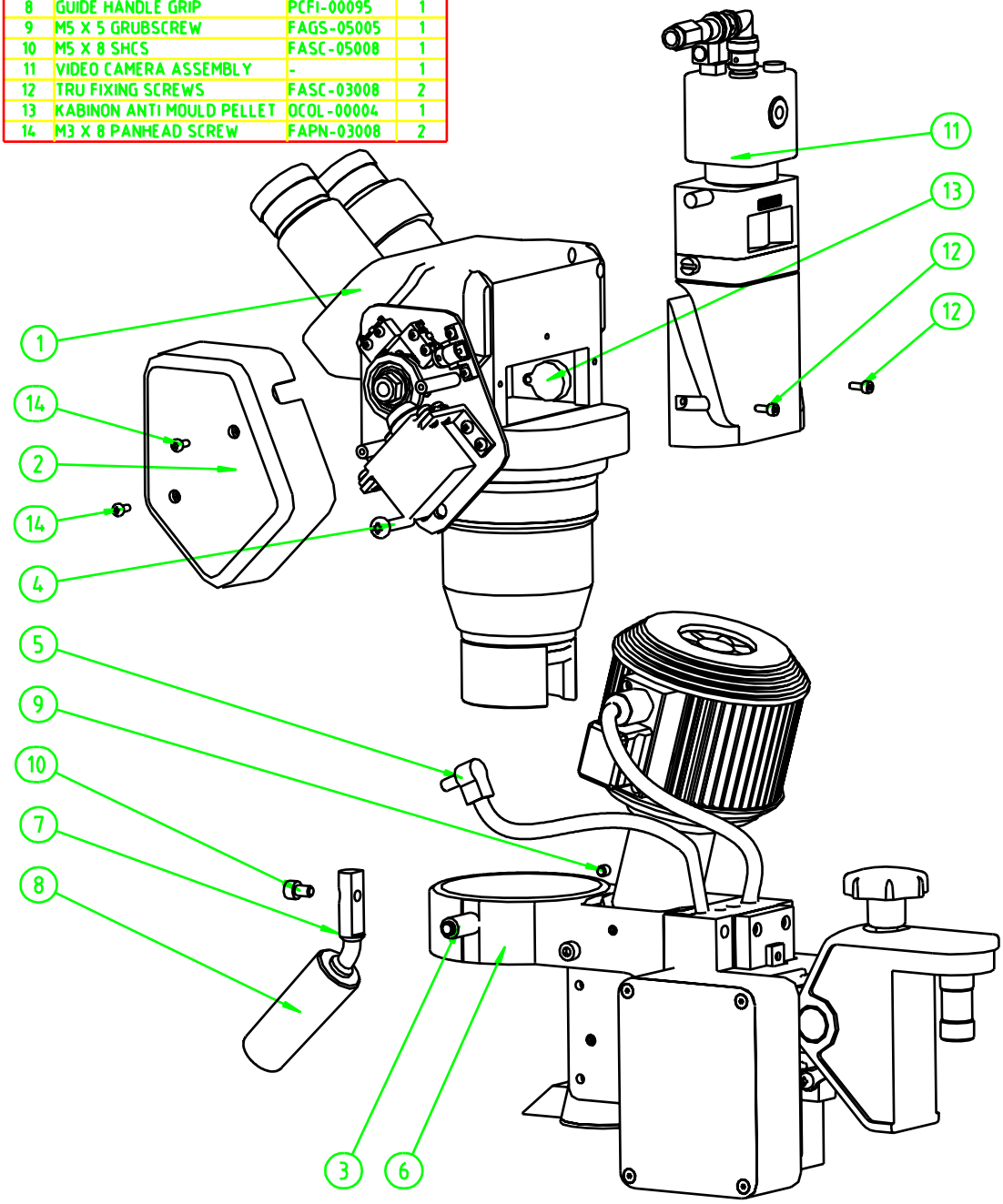
Microswitch
re-order code
ECSW-00004



SO-5600 MOULD PELLET REPLACEMENT

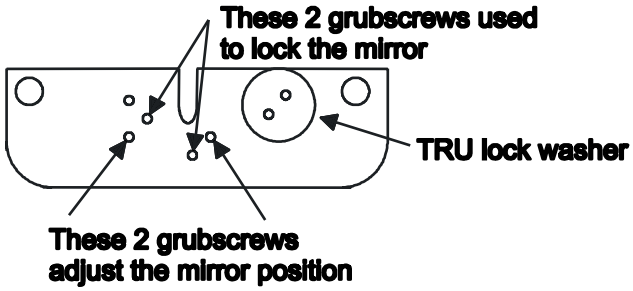
SERVICE MANUAL 5600 S1
SCANOPTICS
Drawn by: RJK
Date:02/08/02

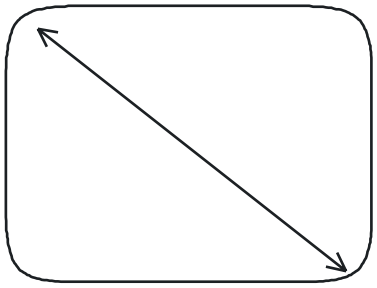
Item	Name	Part No	Qty
1	MICROSCOPE HEAD	OCOL-00002	1
2	ZOOM COVER	PCFI-00122	1
3	ZOOM SPACER 3	PCFI-00119	1
4	M5 X 25 PANHEAD SCREW	FAPN-05025	1
5	ZOOM CABLE ASSEMBLY	SAFI-00037	1
6	BONDER ARM	PCFI-00093	1
7	GUIDE HANDLE	PCFI-00094	1
8	GUIDE HANDLE GRIP	PCFI-00095	1
9	M5 X 5 GRUBSCREW	FAGS-05005	1
10	M5 X 8 SHCS	FASC-05008	1
11	VIDEO CAMERA ASSEMBLY	-	1
12	TRU FIXING SCREWS	FASC-03008	2
13	KABINON ANTI MOULD PELLET	OCOL-00004	1
14	M3 X 8 PANHEAD SCREW	FAPN-03008	2



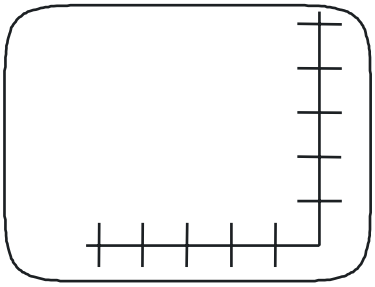
BEAM SPLITTER ADJUSTMENT

SERVICE MANUAL
5600
S2
SCAN OPTICS
Drawn by: RJK
Date:30/5/2

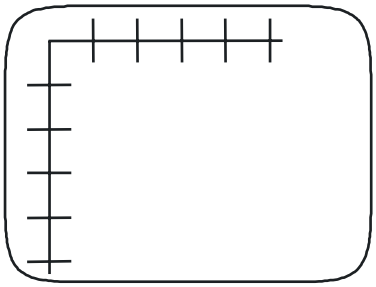




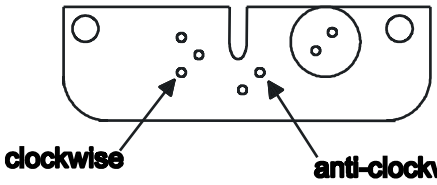
Mirror adjustment moves image in this direction

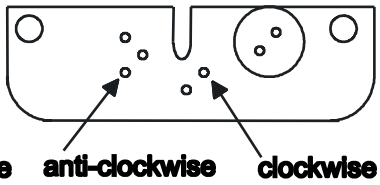


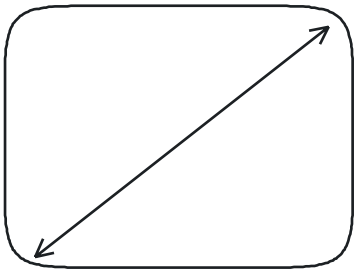
If the target centre is on the bottom RHS corner of the screen, move the mirror forward at the top



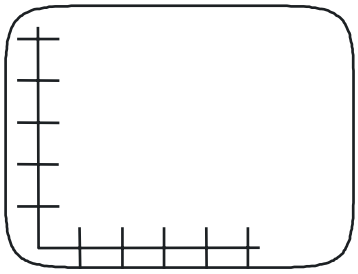
If the target centre is on the top LHS corner of the screen, move the mirror back at the top



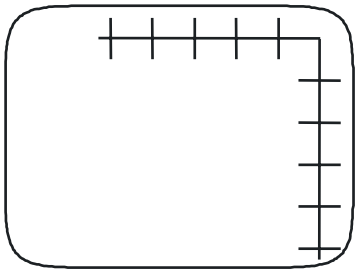




Eccentric stop moves image in this direction



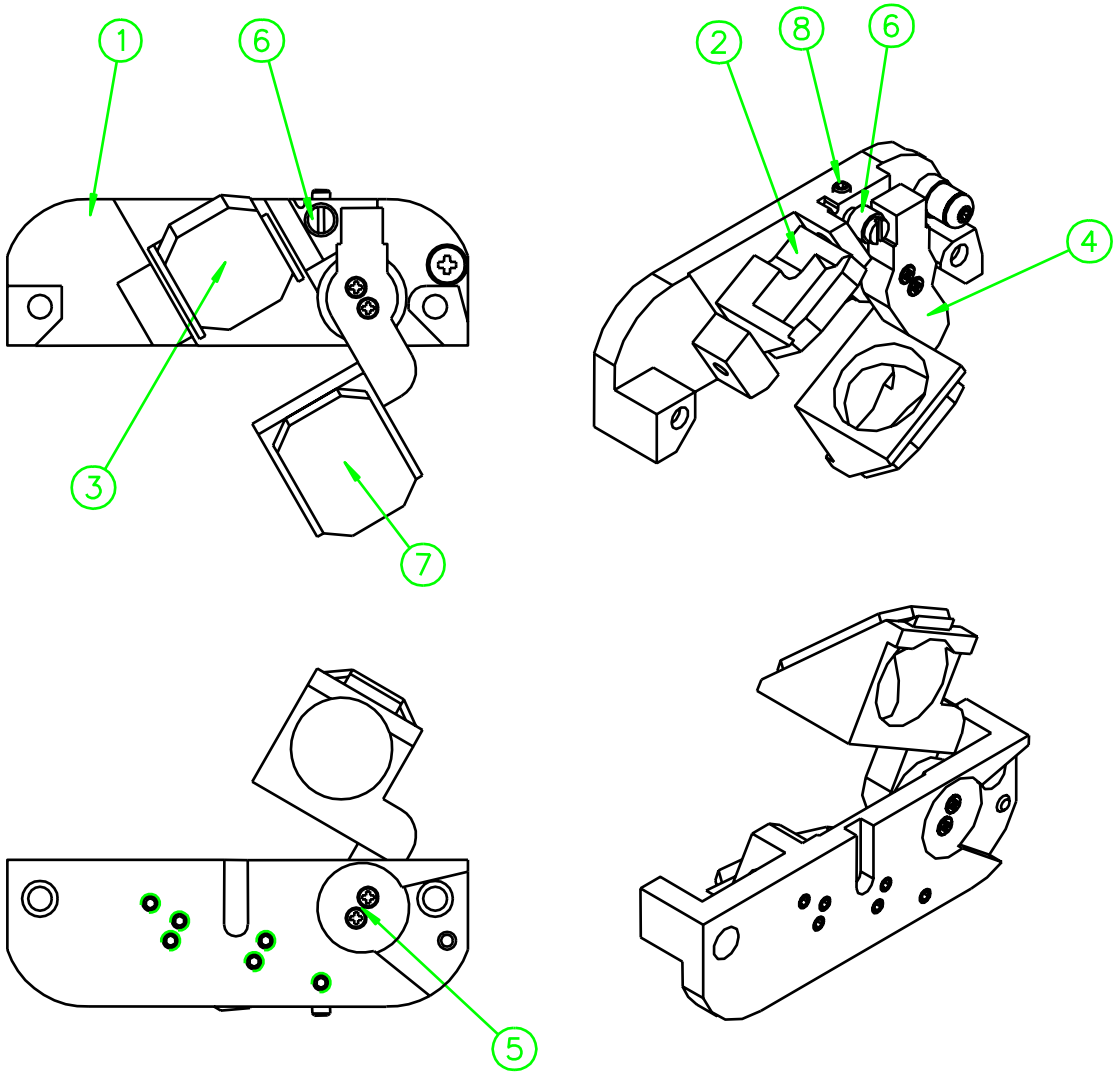
If the target centre is on the bottom LHS corner of the screen, need less stop. Rotate clockwise



If the target centre is on the top RHS corner of the screen, need more stop. Rotate anti-clockwise

SO-5600 BEAM SPLITTER ADJUSTMENT

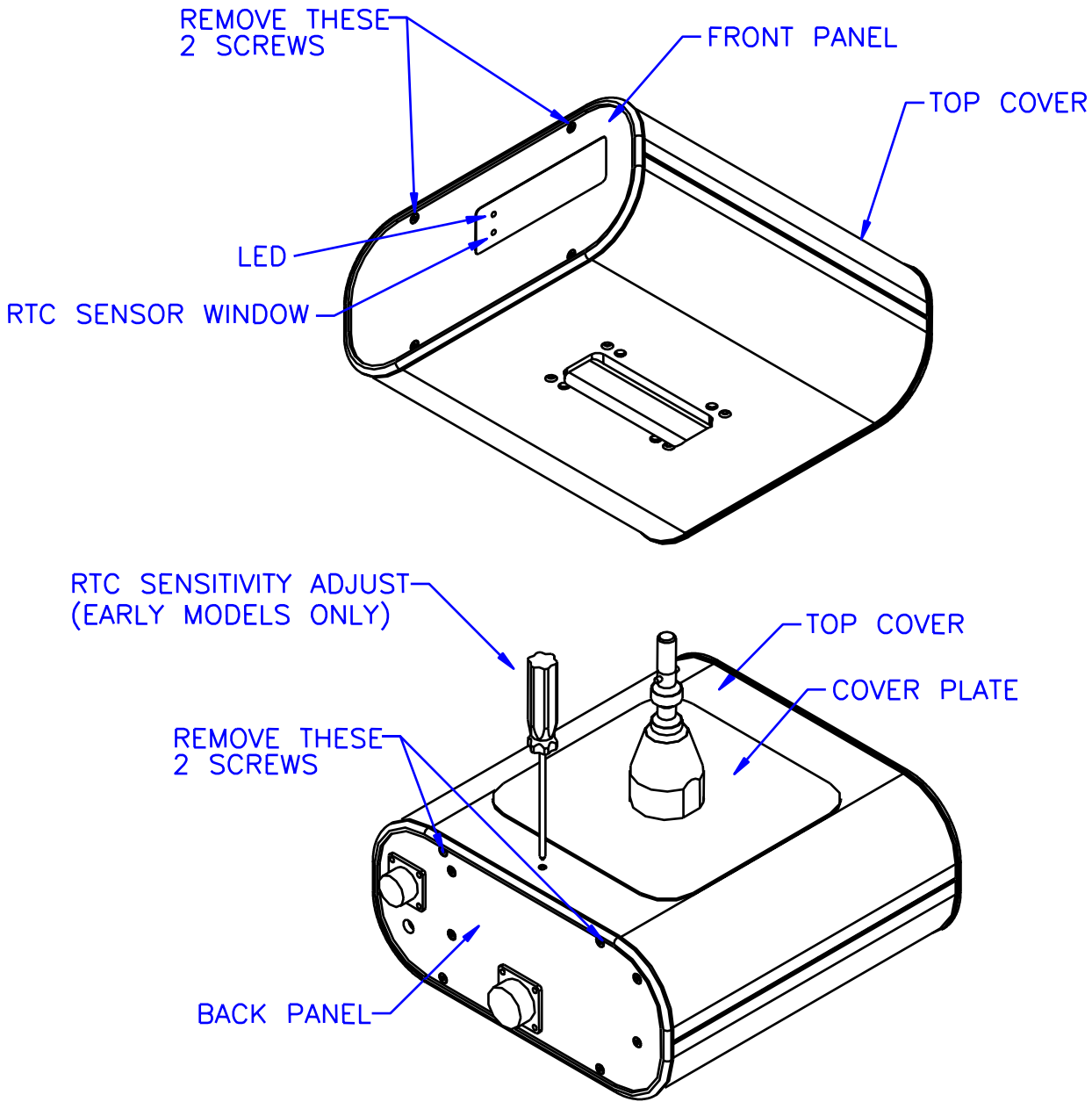
SERVICE MANUAL
5600
S3
Drawn by: RJK
Date: 16/08/02
SCANOPTICS



Item	Name	Qty
1	TRU MOUNT BASE	1
2	MIRROR MOUNT	1
3	MIRROR	1
4	BEAMSPLITTER PIVOT	1
5	TRU LOCK WASHER	1
6	ECCENTRIC STOP	1
7	BEAMSPLITTER	1
8	STOP LOCKING GRUBSCREW	1

X–Y UNIT TOP COVER REMOVAL

SERVICE MANUAL 5800 S1
SCAN OPTICS
Drawn by: RJK
Date:13/8/2



WIRING DIAGRAMS

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5000-W3	SDS-213 Controller board and interface	65
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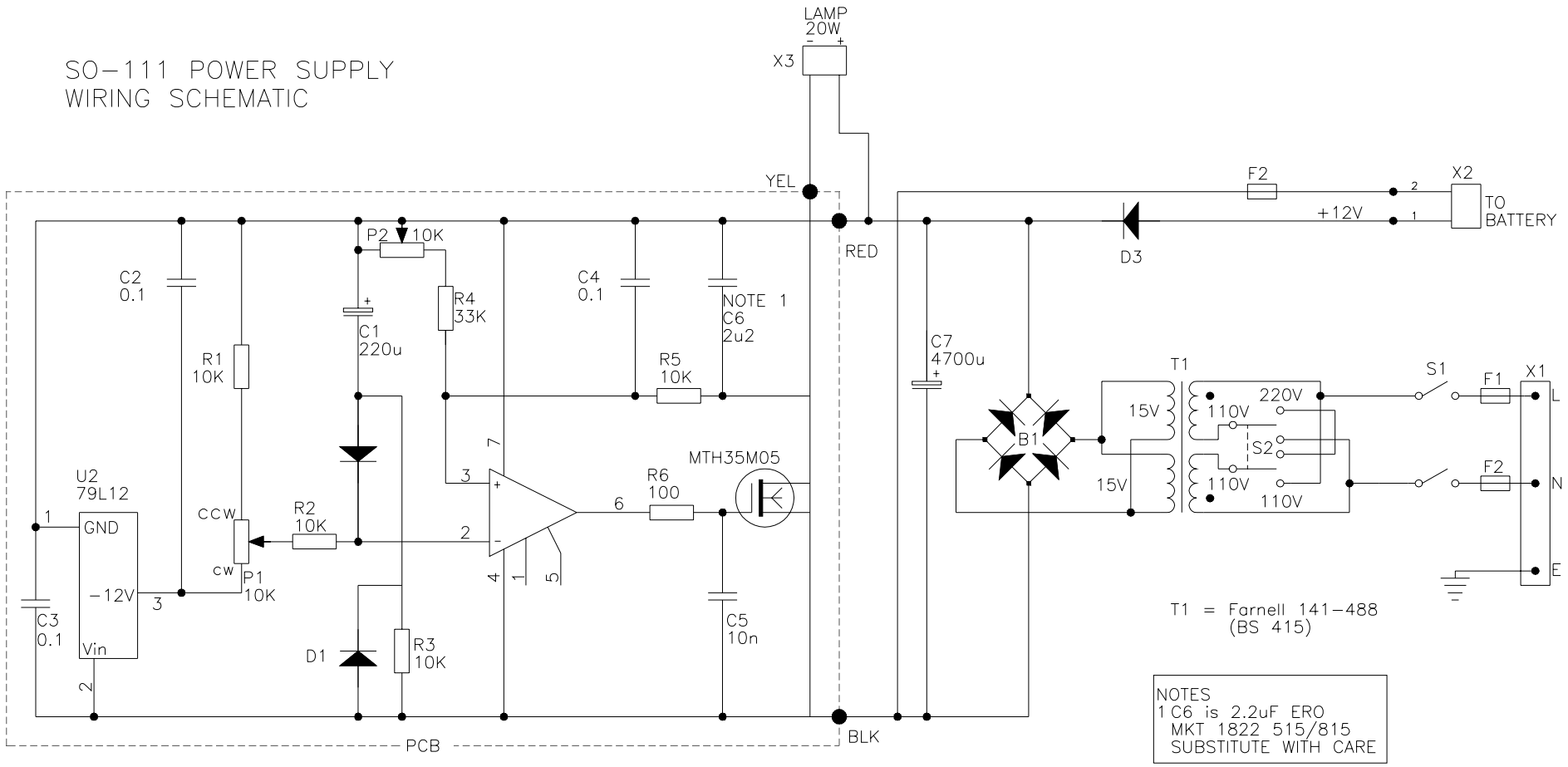
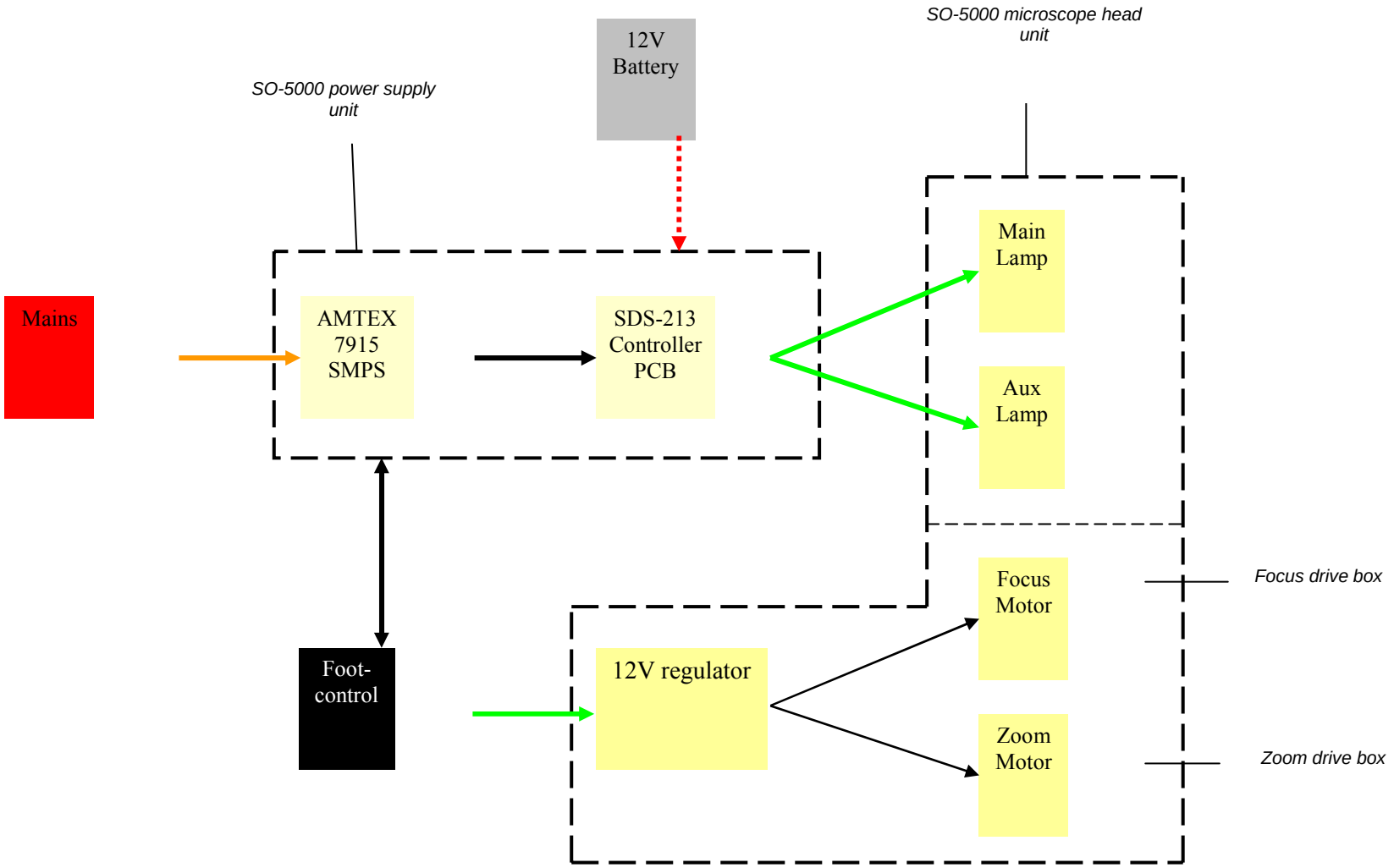
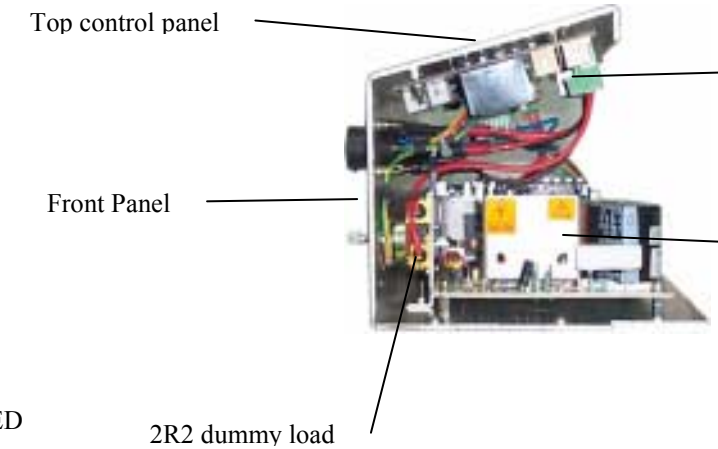
111-W1: SO-111/151/161 POWER SUPPLY SCHEMATIC



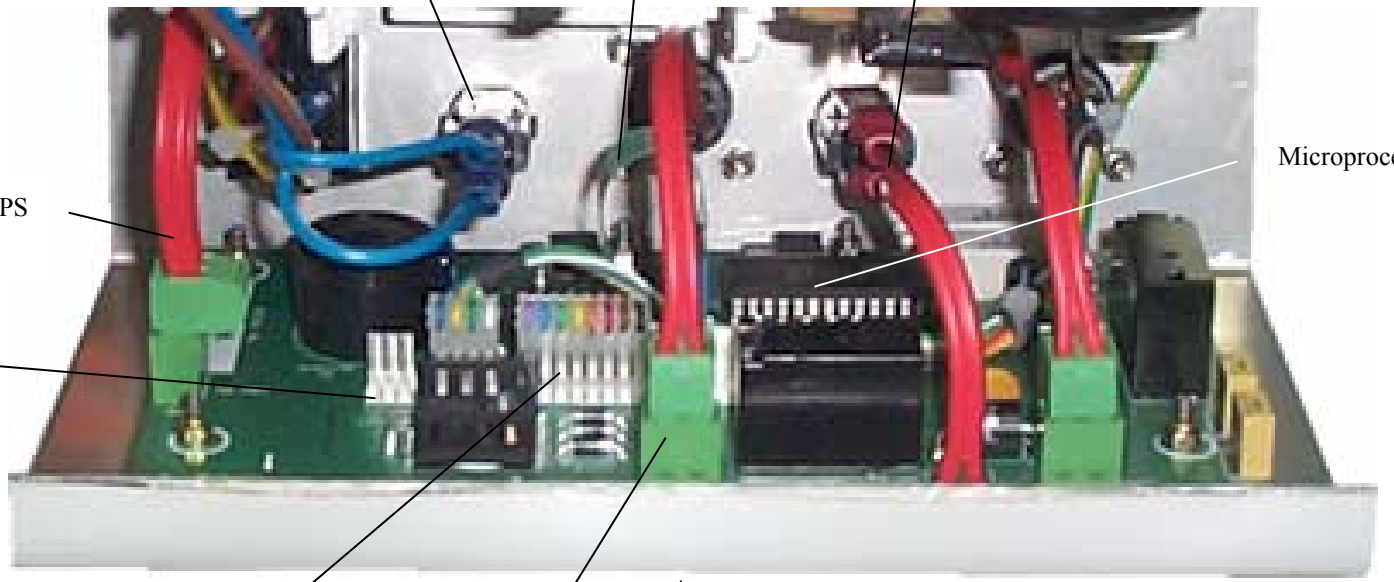
5000-W1: SO-5000/5100/5600 POWER AND CONTROL BLOCK DIAGRAM



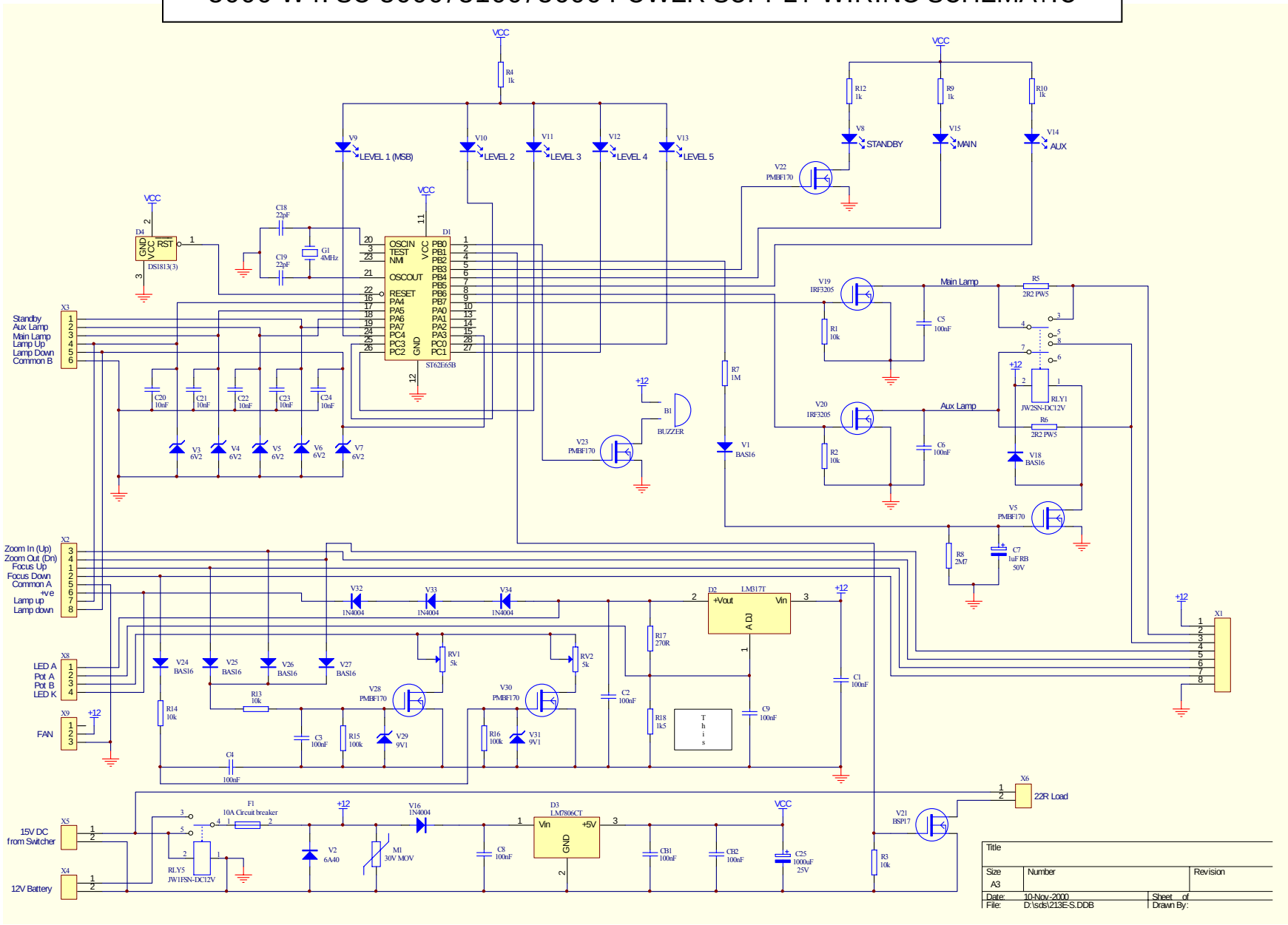
5000-W2: SO-5000/5100/5600 POWER SUPPLY



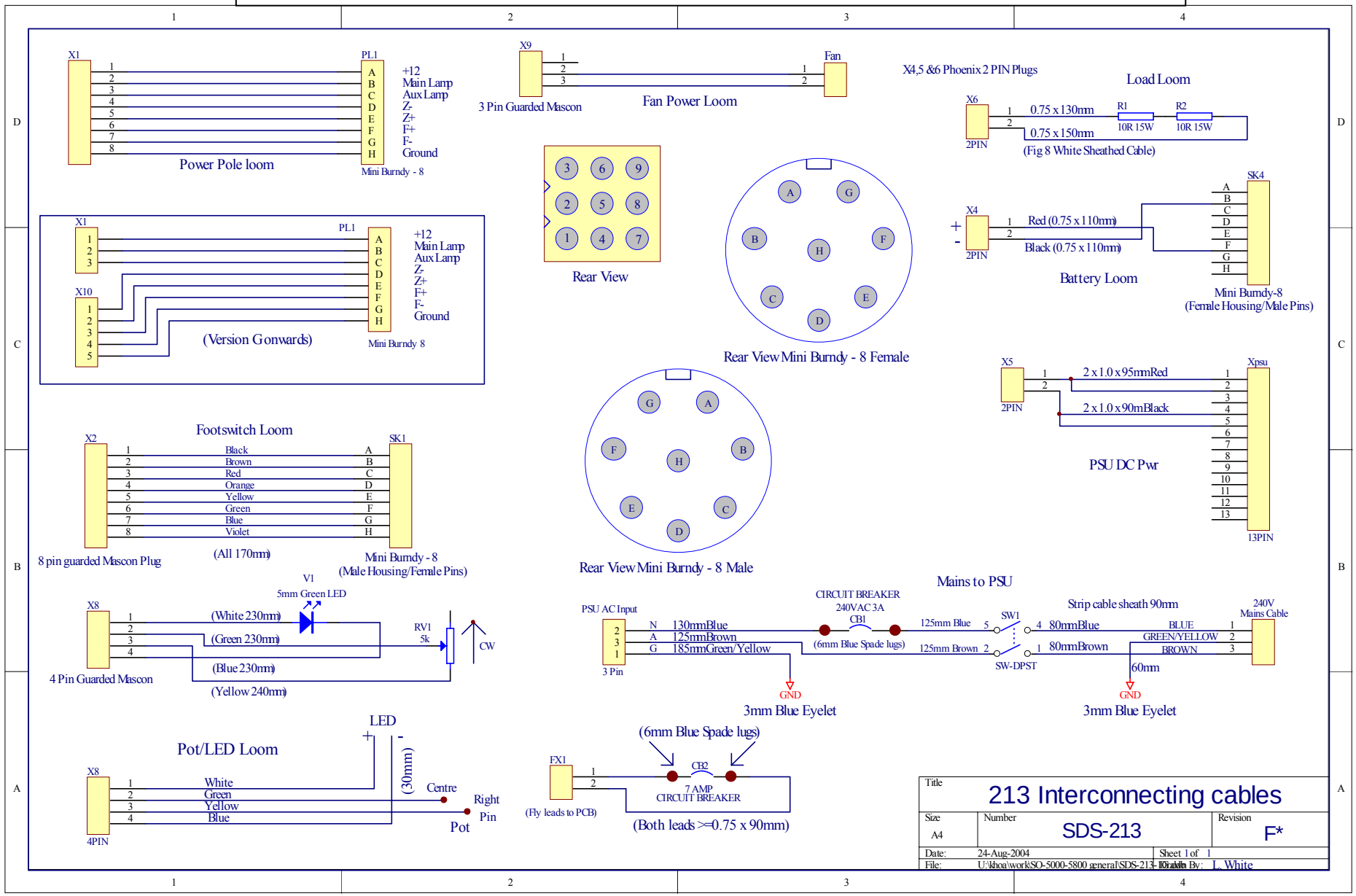
5000-W3: SDS-213 CONTROLLER BOARD AND INTERFACE


Ribbon cable from top panel keypad
3A Neutral Line circuit breaker
7A overload circuit breaker
Microprocessor controller
15V source from SMPS
12V internal cooling fan socket header
Connector to footswitch socket
External power source input
Main upper control panel

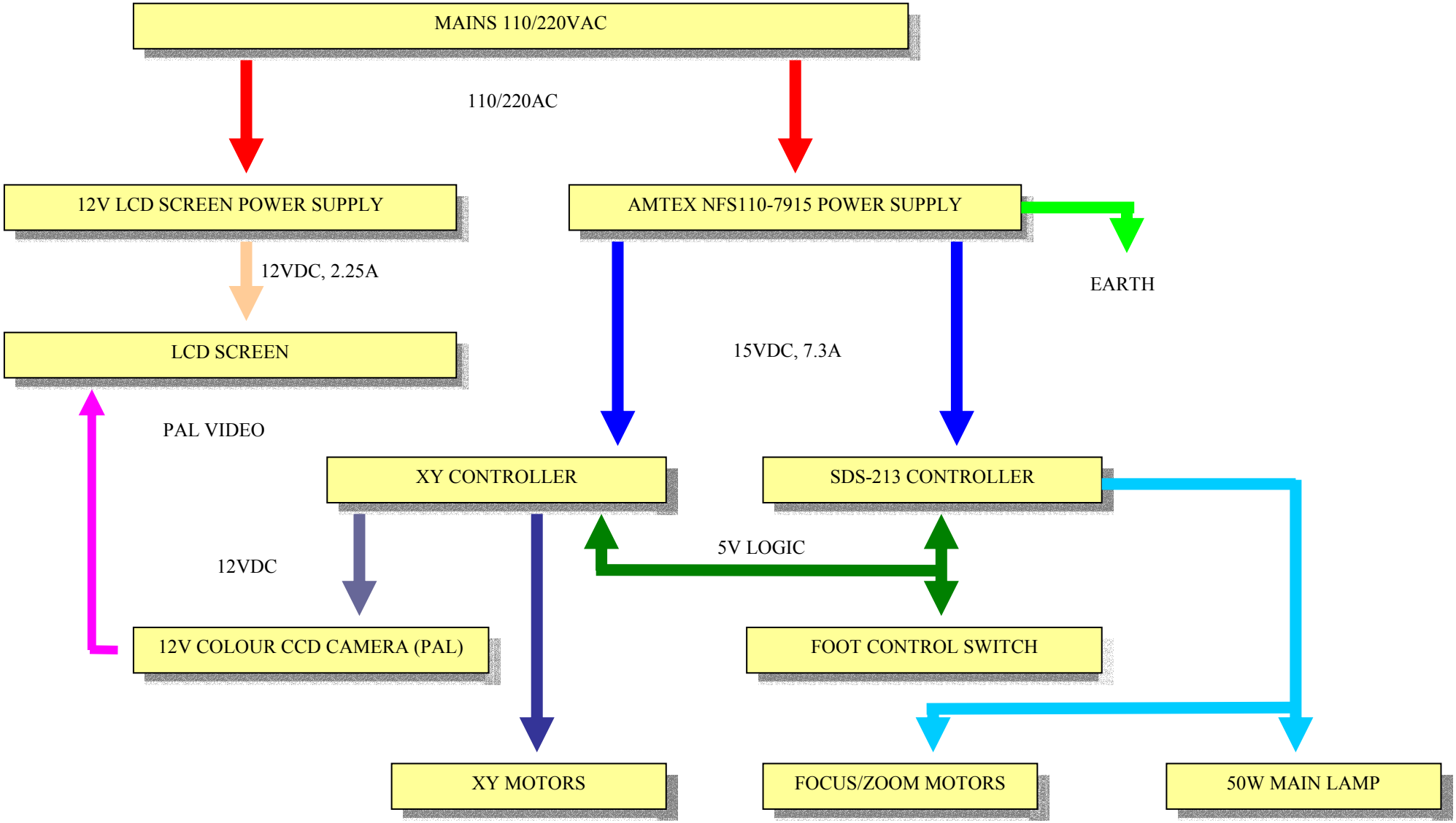
5000-W4: SO-5000/5100/5600 POWER SUPPLY WIRING SCHEMATIC



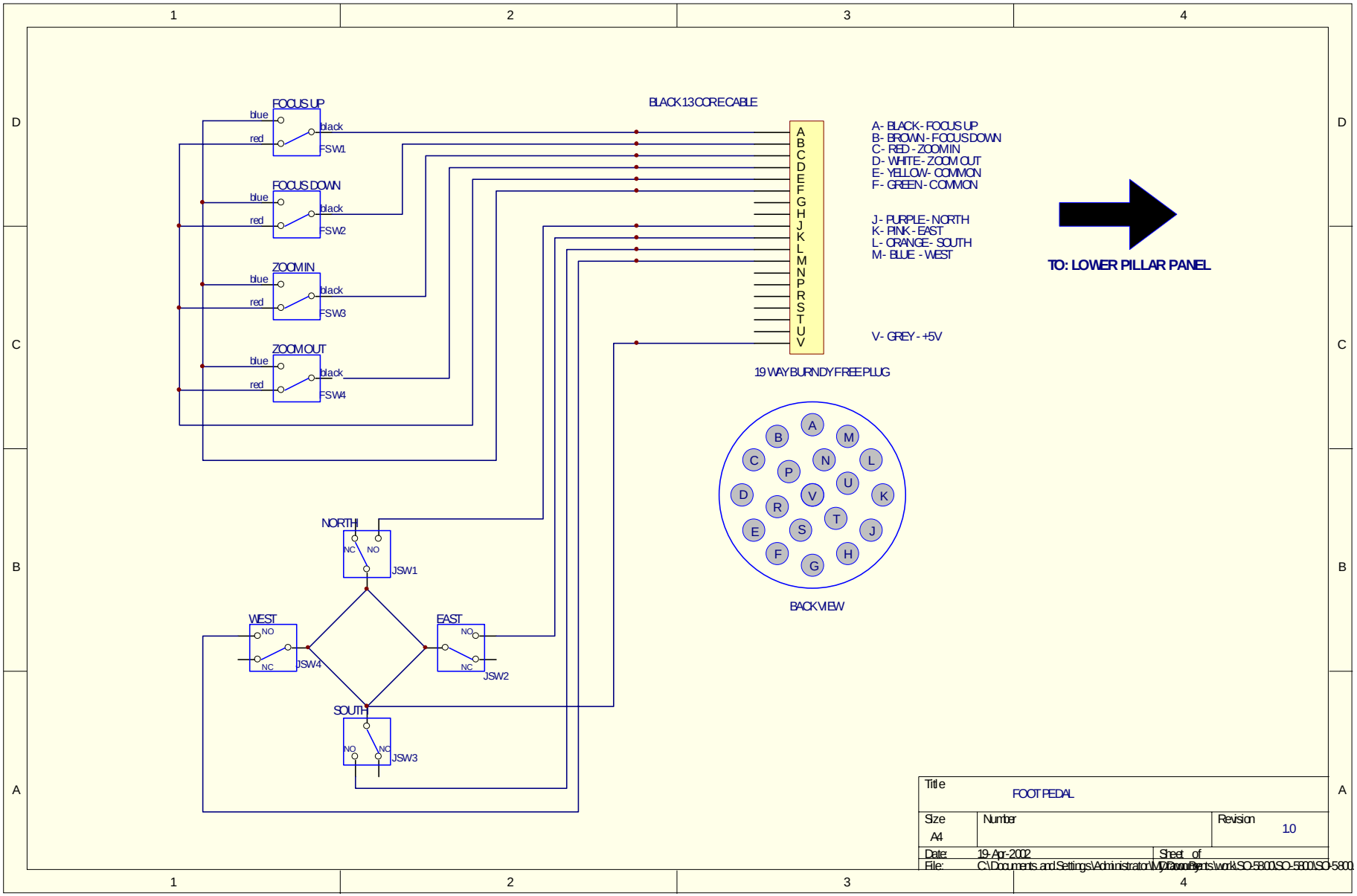
5000-W5: SO-5000/5100/5600 POWER SUPPLY INTER-CONNECTORS



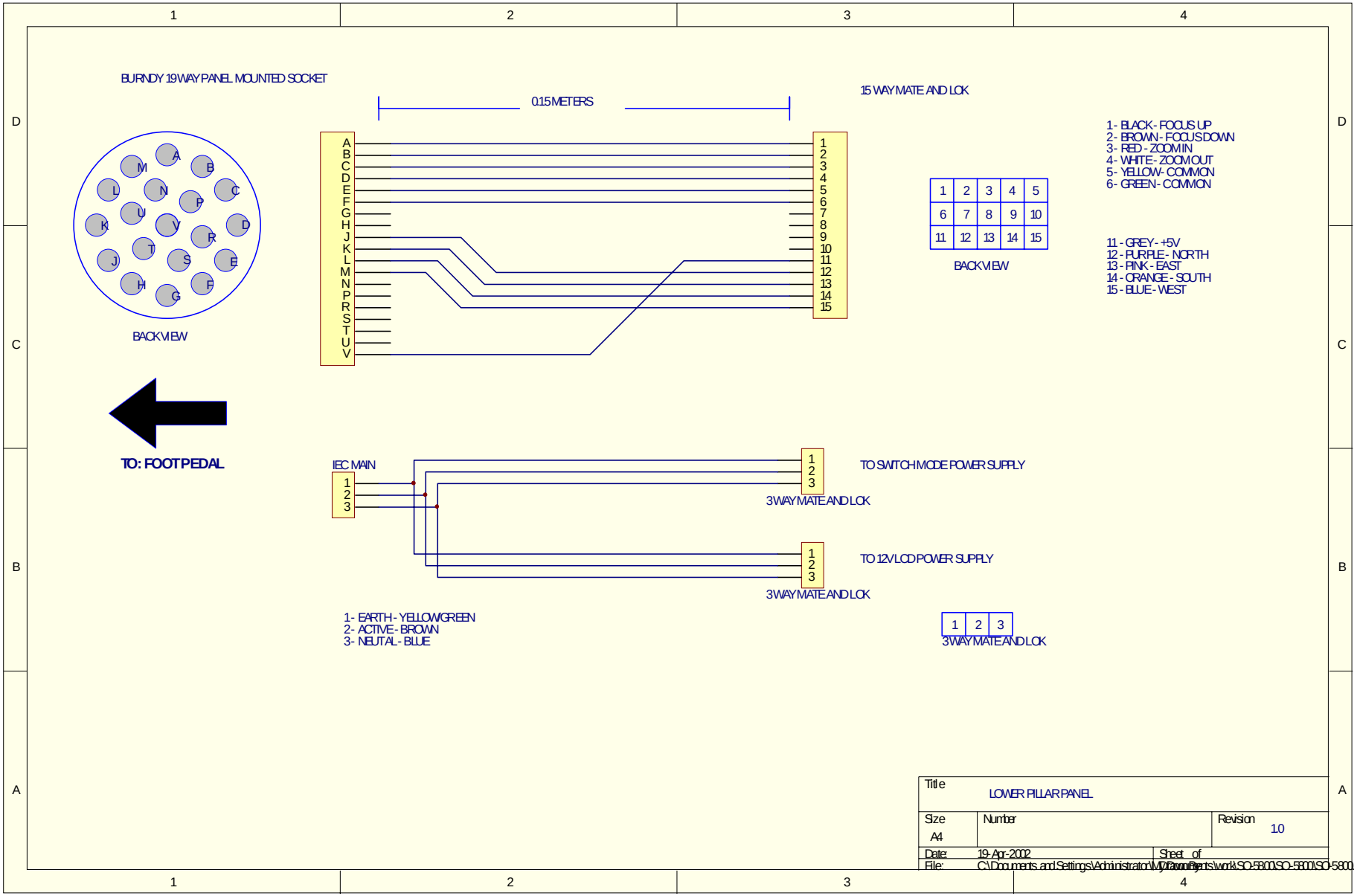
5800-W1: SO-5800 POWER AND CONTROL BLOCK DIAGRAM



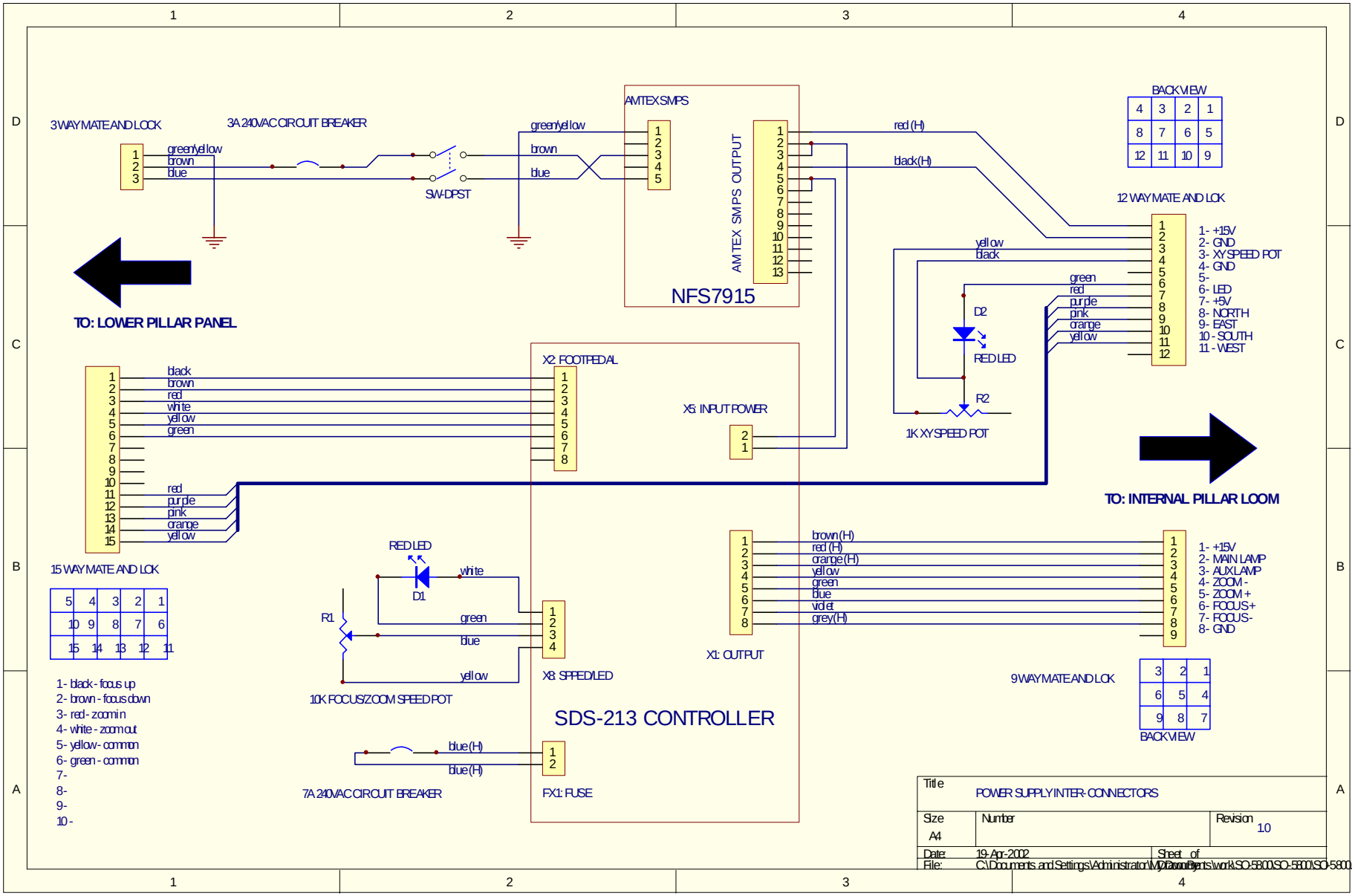
5800-W2: SO-5800 FOOT CONTROL WIRING SCHEMATIC



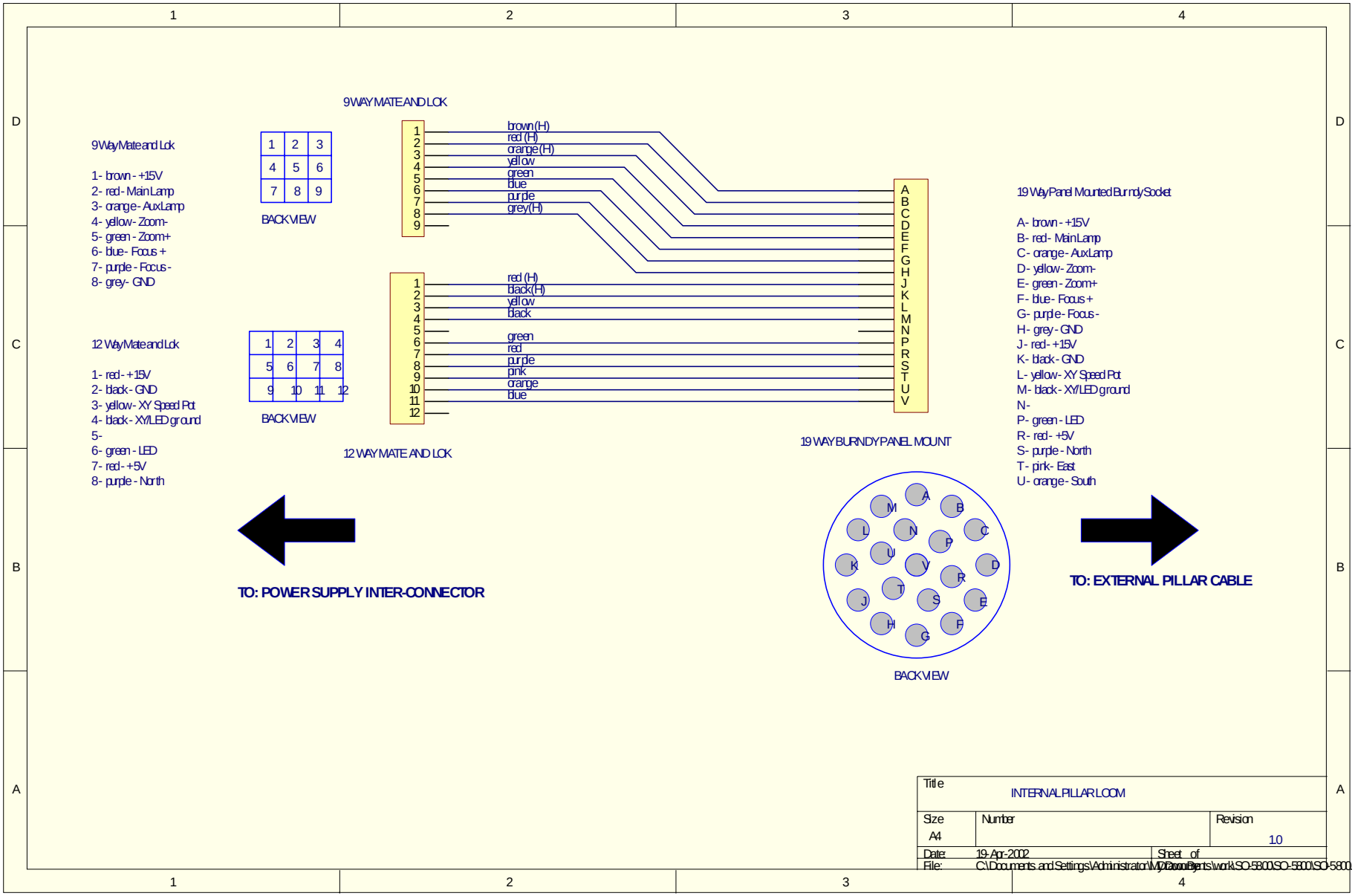
5800-W3: SO-5800 LOWER PILLAR PANEL SCHEMATIC



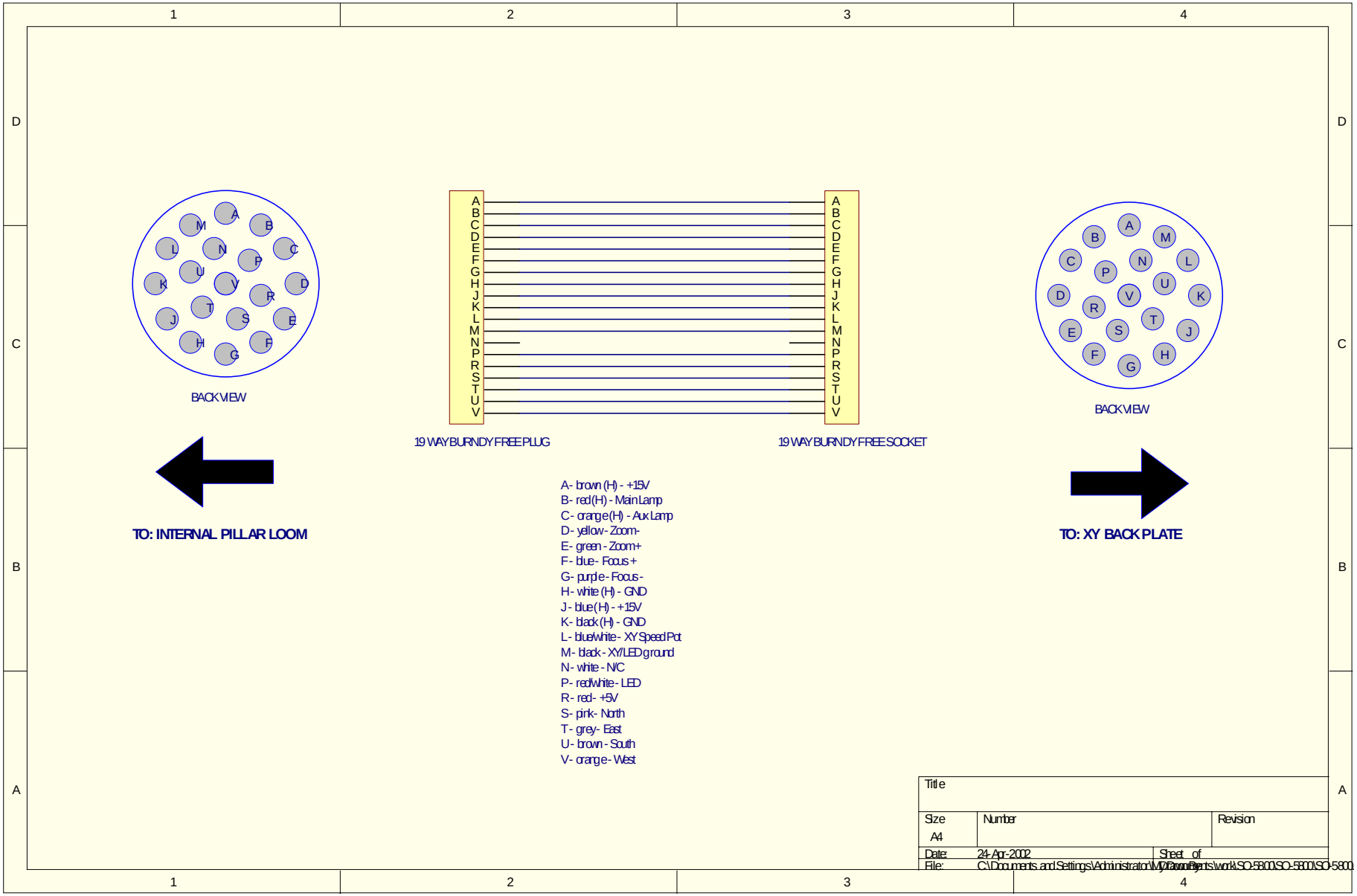
5800-W4: SO-5800 POWER SUPPLY INTER-CONNECTORS



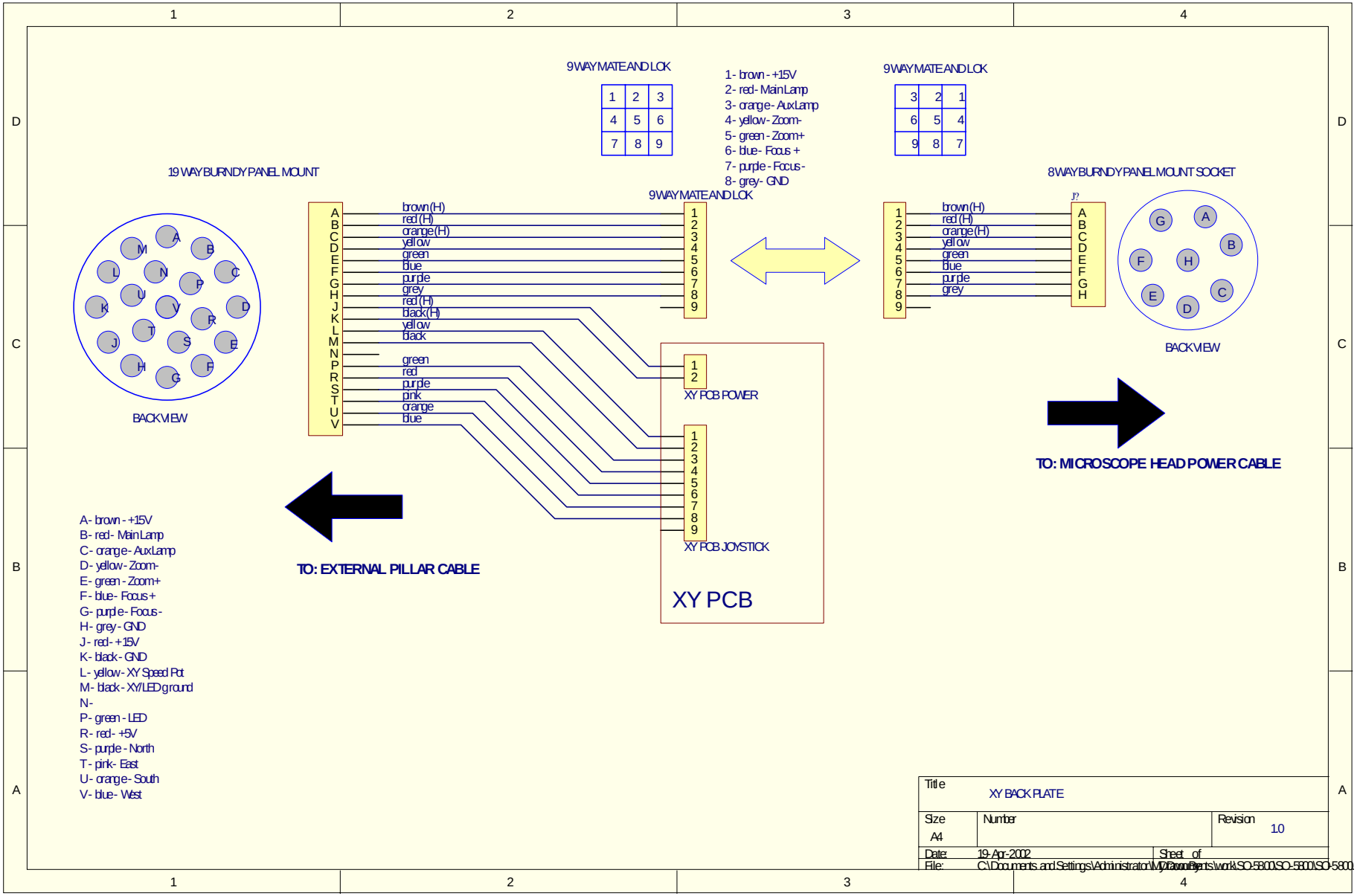
5800-W5: SO-5800 INTERNAL PILLAR/HORIZONTAL ARM LOOM



5800-W6: SO-5800 EXTERNAL MICROSCOPE POWER CABLE



5800-W7: SO-5800 X-Y BACK PLATE



5800-W8: SO-5800 HEAD POWER CABLE